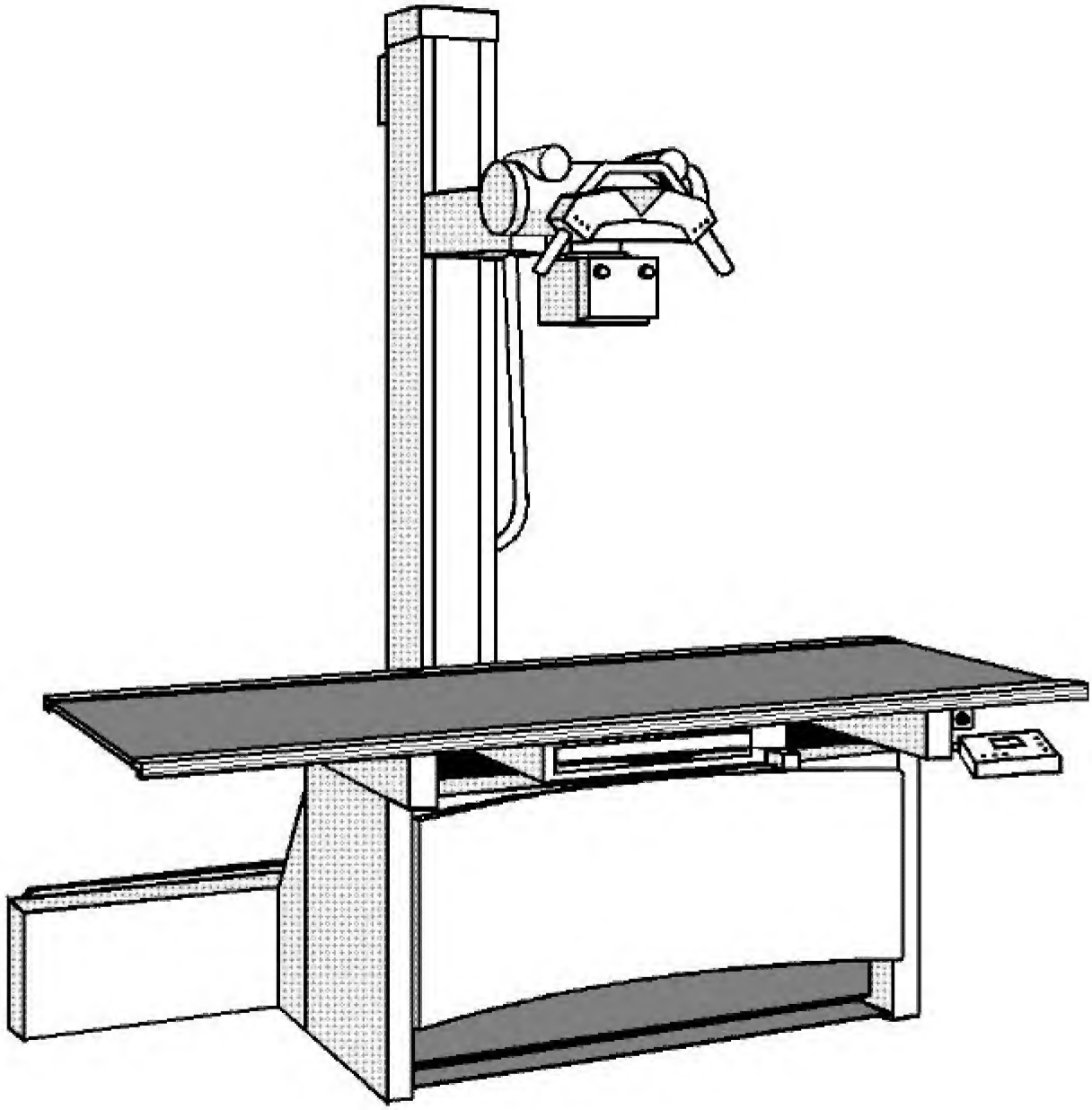
Mounting Instructions CS 2000 Tomo-2



CE 0125

English Edition

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1. Technical data

1.1 General safety notes

The electrical installation shall conform to all mandated laws and regulations.
Check the installation layout plan.
During the installation it is important to check that all protective ground wire connections provided by the manufacturer are properly made before the equipment is started up.
The protective ground wires between the individual system components and the power supply shall to be connected as shown in the wiring diagram.
Regulation of professional associations concerning safety and accident prevention shall be observed. No work may be performed on parts carrying a voltage higher than 42 V. If it is necessary to turn on the power for execution of movements of the equipment in the course of installation procedure, it must be shut down immediately after completion of these movements.

1.2 Compatibility

This mounting instruction is valid for CS 2000 Tomo-2 all versions.
The table accommodates all standard dimensions Bucky systems.
A Bucky Wall stand can be installed on the right or left side of the table depending on the user side.

1.3 Climatic conditions

During regular work:

Temperature:	10° C to 40° C
Humidity:	20% to 80%
Air pressure:	700 hPA to 1100 hPa

During transport:

Temperature:	-25° C to 70° C
Humidity:	5% to 95%
Air pressure:	600 hPA to 100 h PA

1.4 Dimensions and weights

of components	Dimensions of components	Weights
Table	1400x770x750 mm	130 kg
Table top	2200x810x 40 mm	35 kg
Column	2320x470x302 mm	175 kg
Rail stand	2250x183x302 mm	80 kg
Tube stand with vertical carriage	600x500x200 mm	32 kg

of packing case	Dimensions of cases	Weights
Table	1530x860x960 mm	190 kg
Table top	2320x930x200 mm	56 kg
Column		
Rail stand	2400x780x760 mm	405 kg
Tube stand with vertical carriage		

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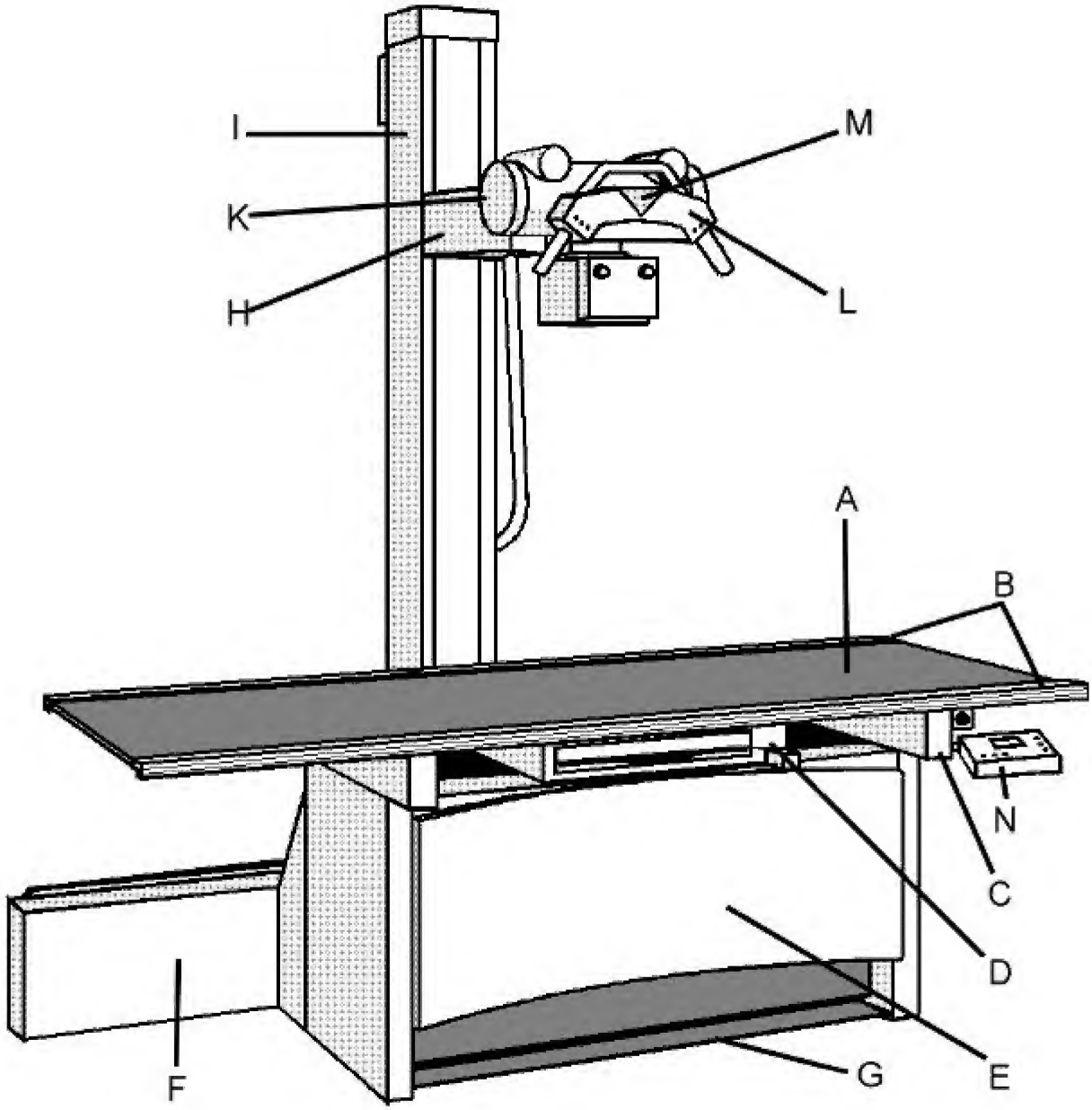
1.5 Component Designation



A Table top, floating, manually movable, scratch resistant
B Accessory rail with trim cover, accepts accessories
C Upper table frame
D Bucky unit, movable
E Table base, solid, vibration-free
F Guide rails for tube stand
G Foot treadle
H Vertical carriage with X-ray tube support arm
I Tube stand, rotatable
K X-ray tube
L Control arm
M Protractor
N Tomo control panel

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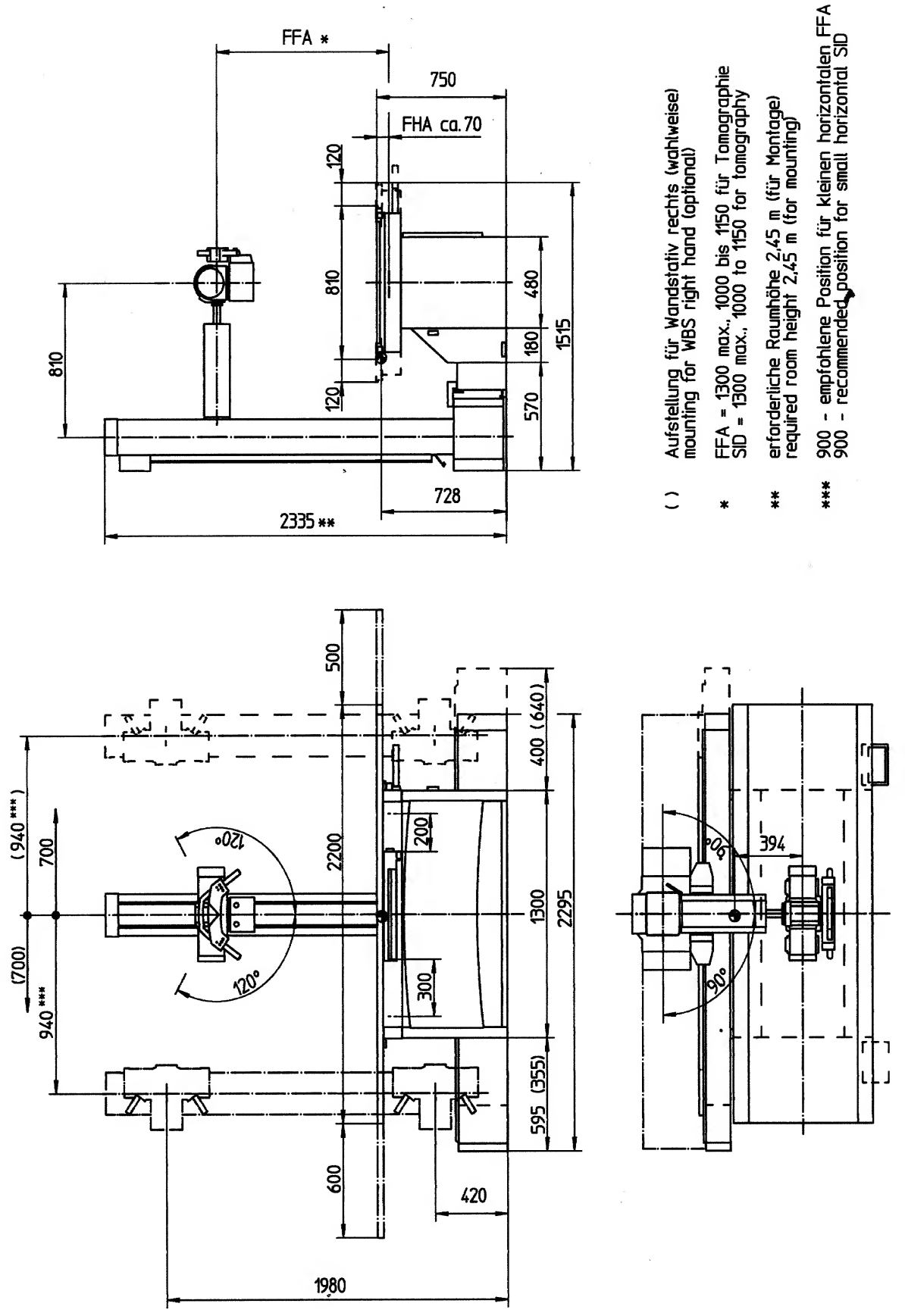
1.6 Dimensional Drawings



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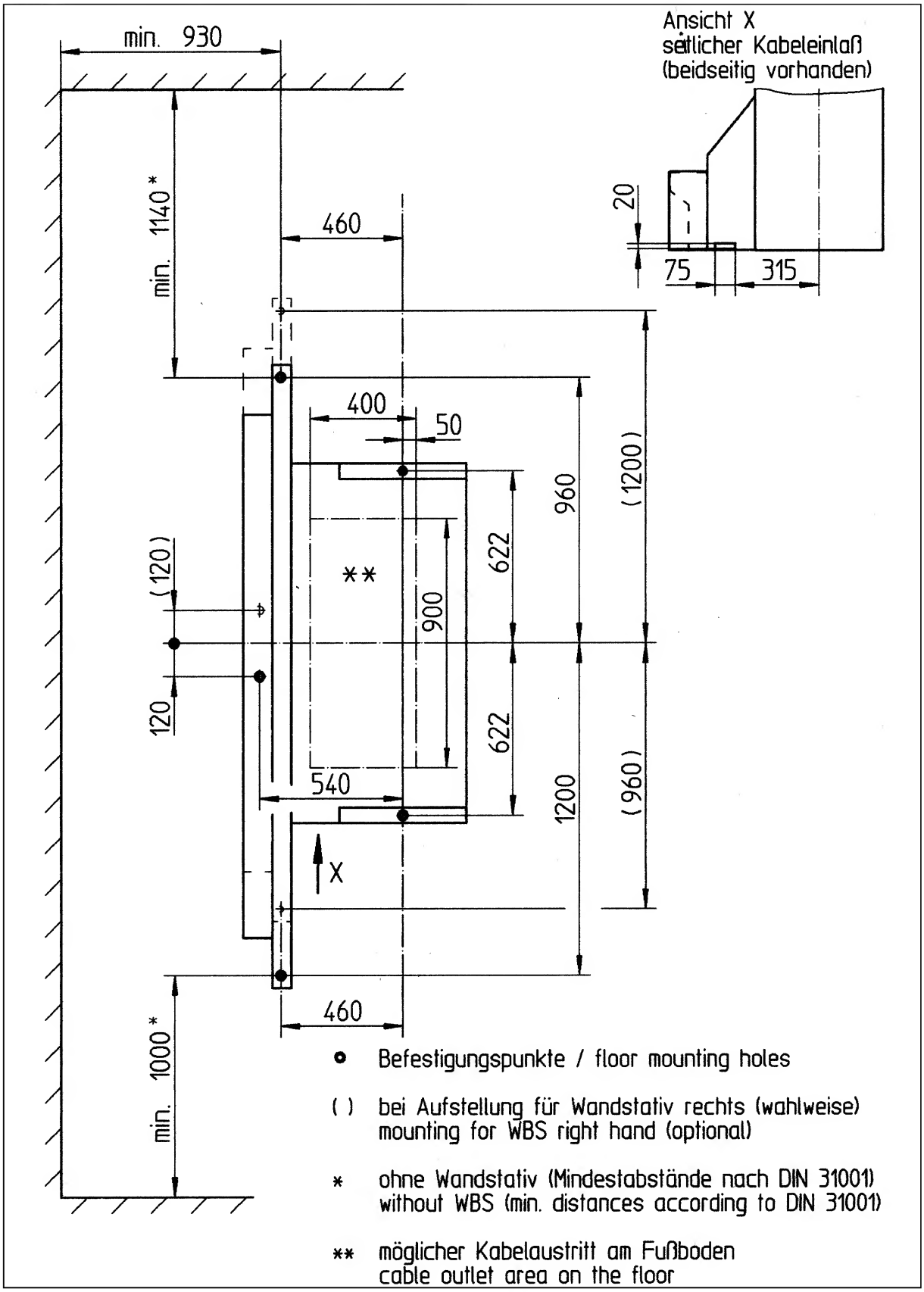
1.7 Dimensional Drawings/Floor Mounting



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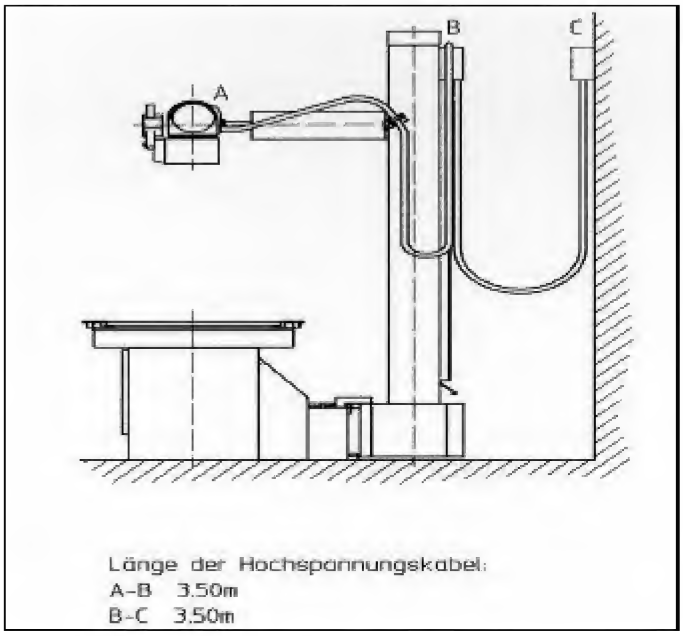
1.8 Installation of high tension cables



1.9 Constructional preparations

The electrical connection data have to correspond with the of the equipment supply voltage.
For the CS 2000 Tomo-2 supply voltage is 115/230 V required with a corresponding ground connection transmission. The mounting points of the CS 2000 have to support a tractive power of 2500 N at each mounting point (concrete floor? B 150 DIN 1045 when using the included fastening material).
Prepare on the floor fastening bore-holes of 12 mm according to drawing 1.6., under consideration of the construction.
The connection cable of the CS 2000, the Bucky and the detector has to be placed constructional depending on the version until the terminal box in the table base or until the Bucky according to the installation plan.
The optional ceiling- wall- terminal box can be mounted if required to the wall or ceiling.

1.10 Necessary measuring means

Liquid level

1.11 Necessary special tools

Hammer drill
Masonry drill 12 bit mm
Socket head cap key 4 mm shortened (is included)

1.12 Power supply data

Power supply:	115/230 V
Frequency:	50 / 60 Hz
Rated current:	6/3 A
Rated power supply voltage:	690 VA

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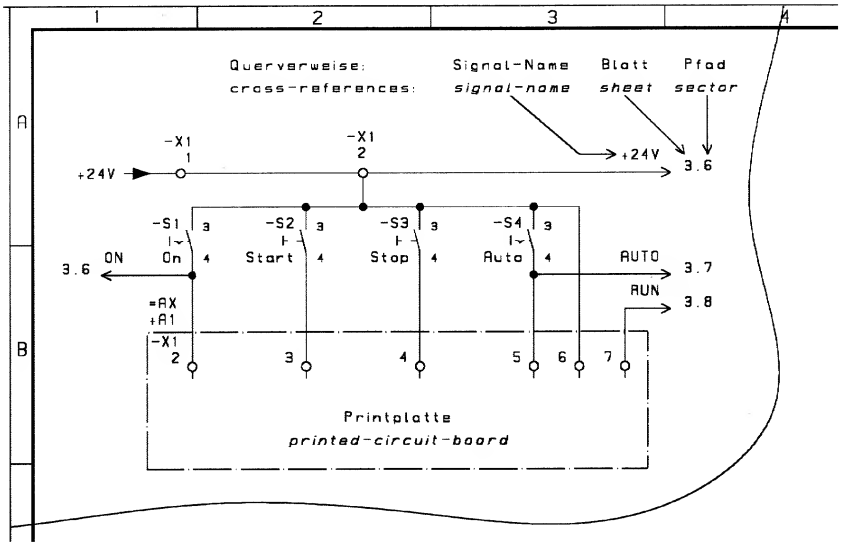
1.13 Schematics sheet 1

1.13.1 Description at Schematics

..... Schematics sheet 2

= AX control panel

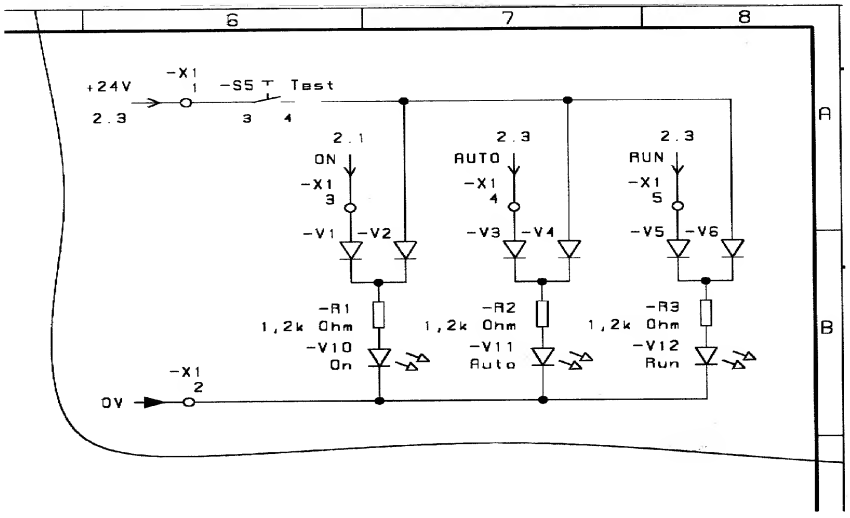
= Unit, Indication



..... Schematics sheet 3

= AX control panel

= Unit, Indication



1.13.1 Table of contents at Schematics

Sheet 2	Schematics	=AA	Table
Sheet 3	Schematics	=AB	Column
Sheet 4	Block diagram	=AC	Tomo
Sheet 5	Schematics	=AC	Power supply Tomo
Sheet 6	Schematics	=AC	Column drive
Sheet 7	Schematics	=AC	Tube drive
Sheet 8	Schematics	=AC	Bucky drive
Sheet 9	Schematics	=AC	Interface & Handcontrol
Sheet 10	Wiring diagram	=AA	Table
Sheet 11	Wiring diagram	=AB	Column, Tomo, Tube
Sheet 12	Wiring diagram	=AC	Tomo interface
Sheet 13	Wiring diagram	=AC	Column, Tomo
Sheet 14	Wiring diagram	=AC	Tomo, Bucky, Handcontrol

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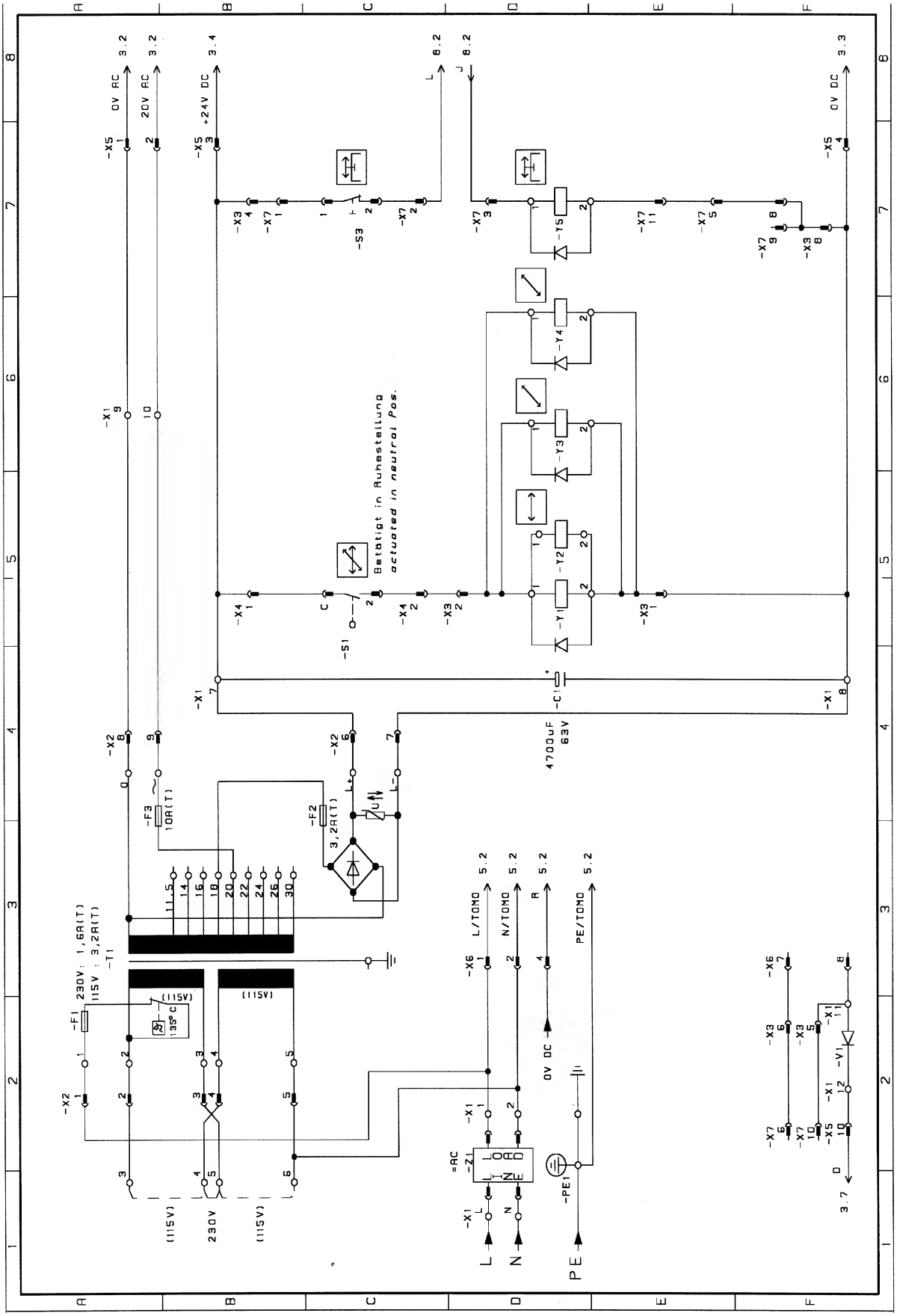
1.13 Schematics sheet 2 =AA Table



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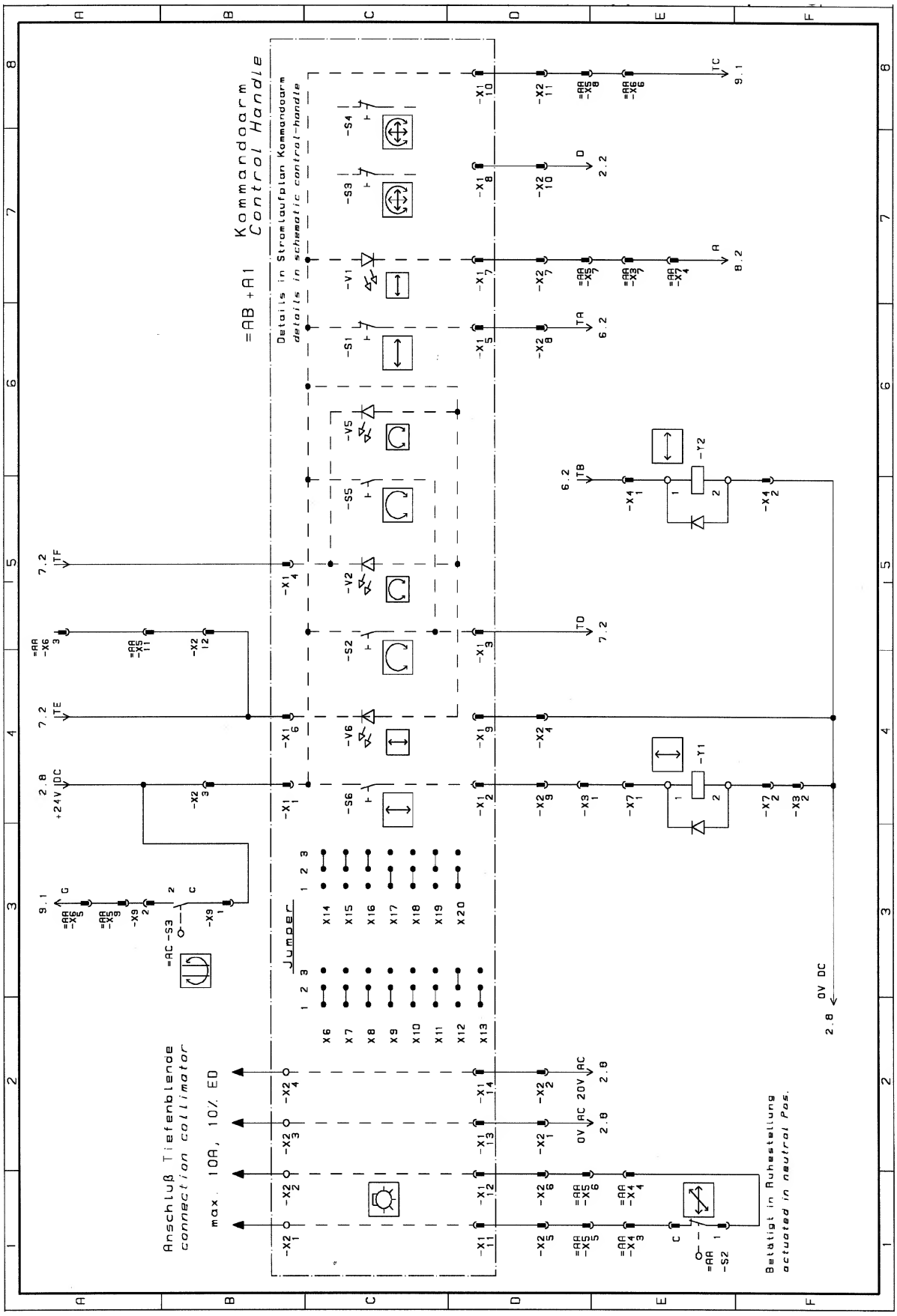
1.13 Schematics sheet 3 =AB Column



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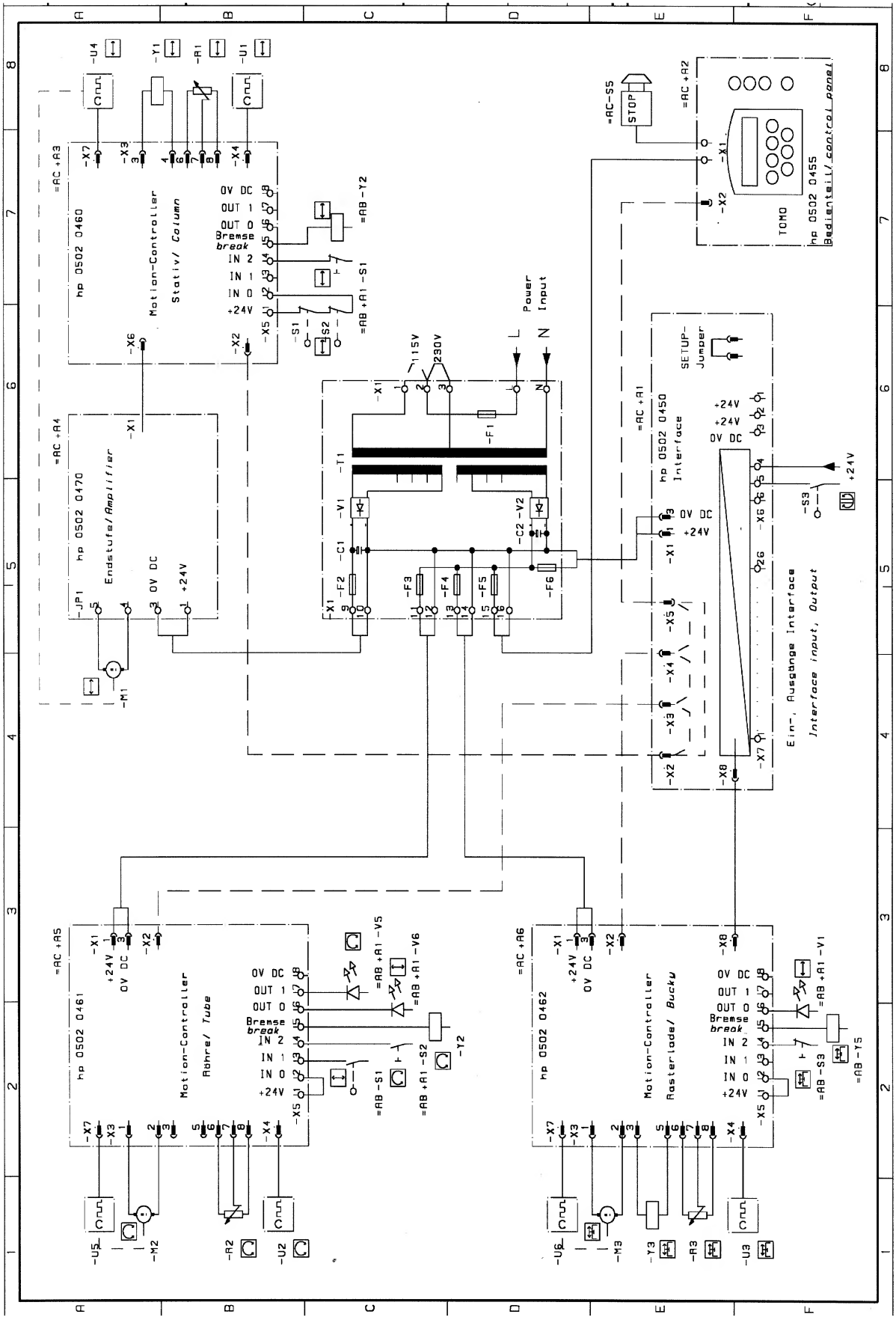
1.13 Schematics sheet 4 =AC Tomo



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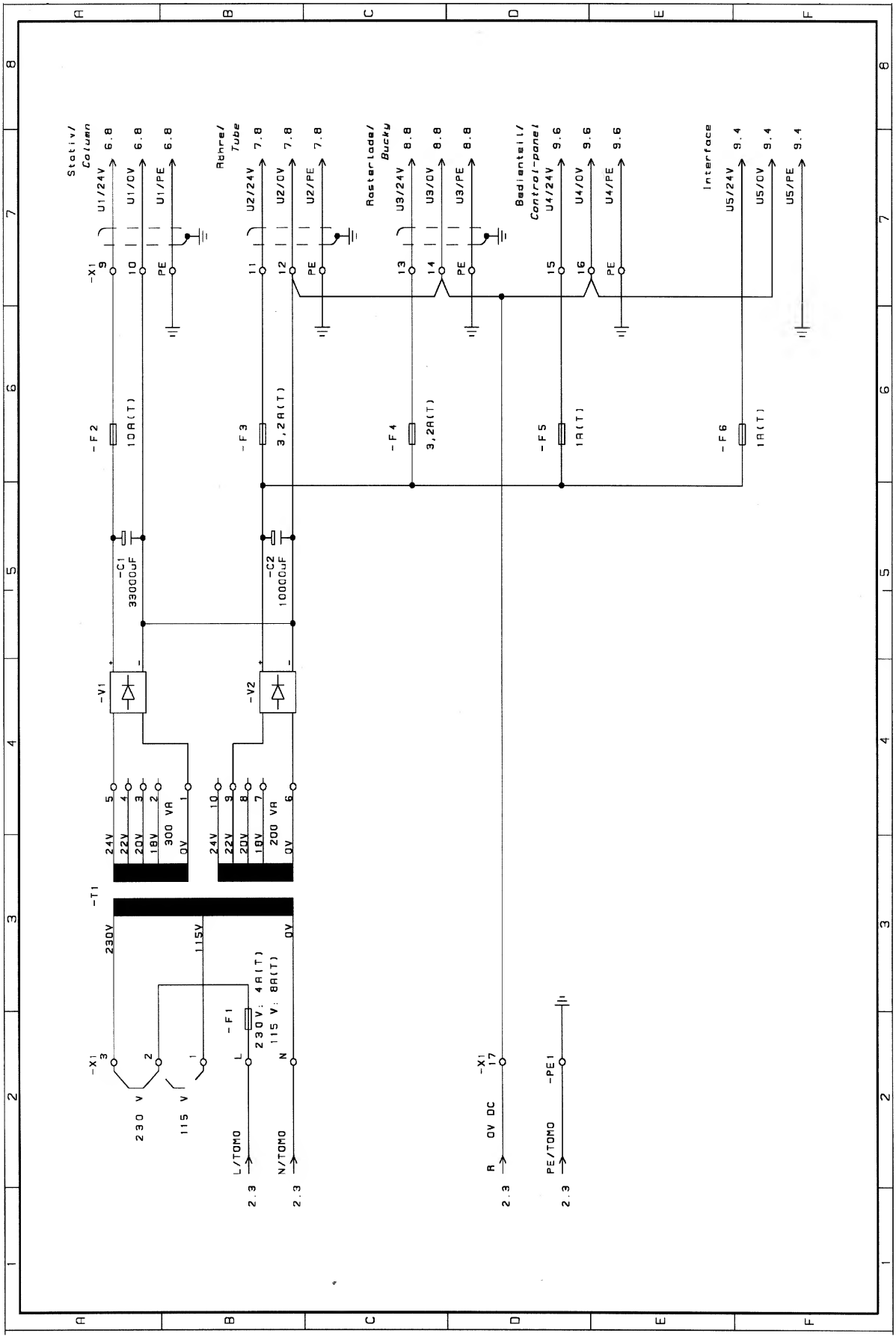
1.13 Schematics sheet 5 =AC Power supply Tomo



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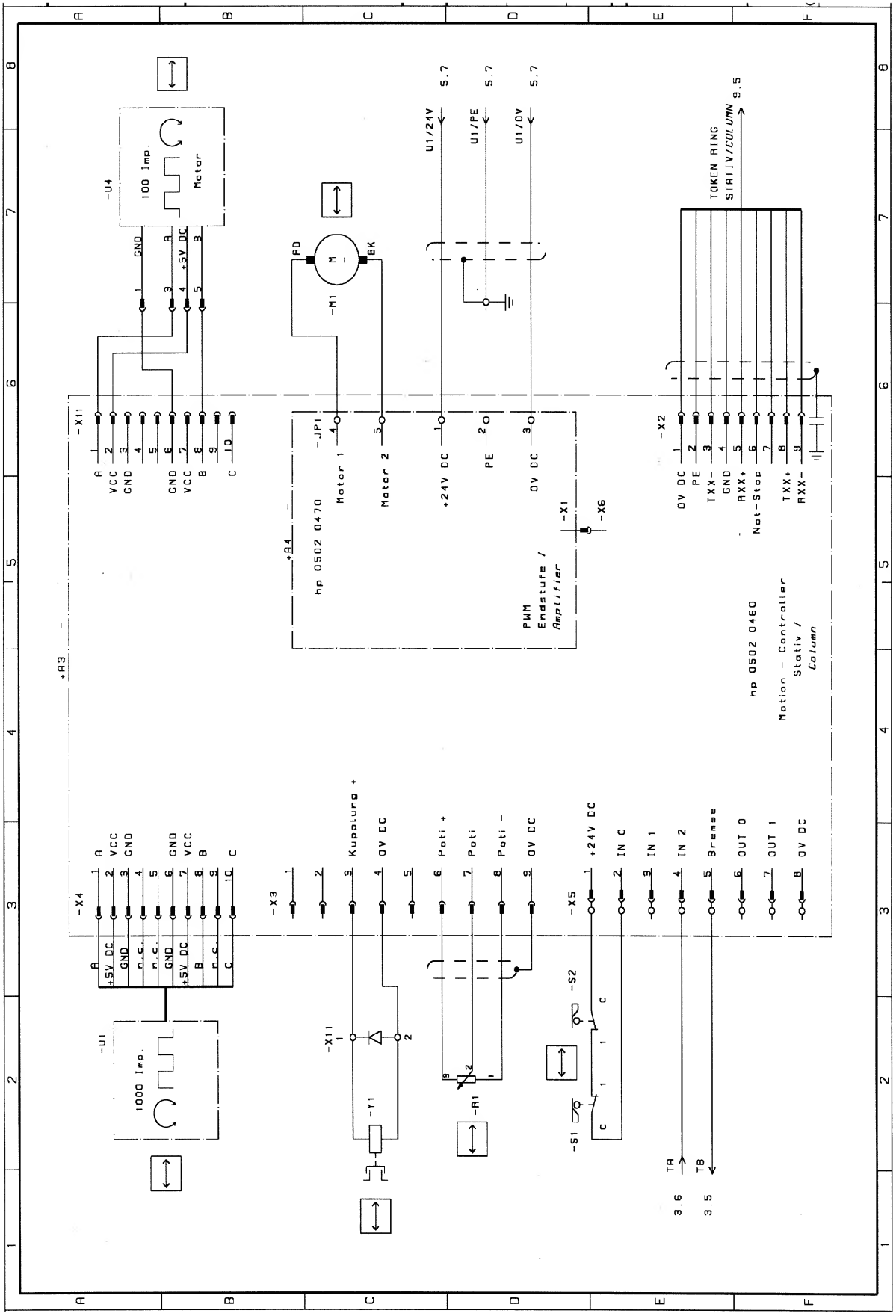
1.13 Schematics sheet 6 =AC Column drive



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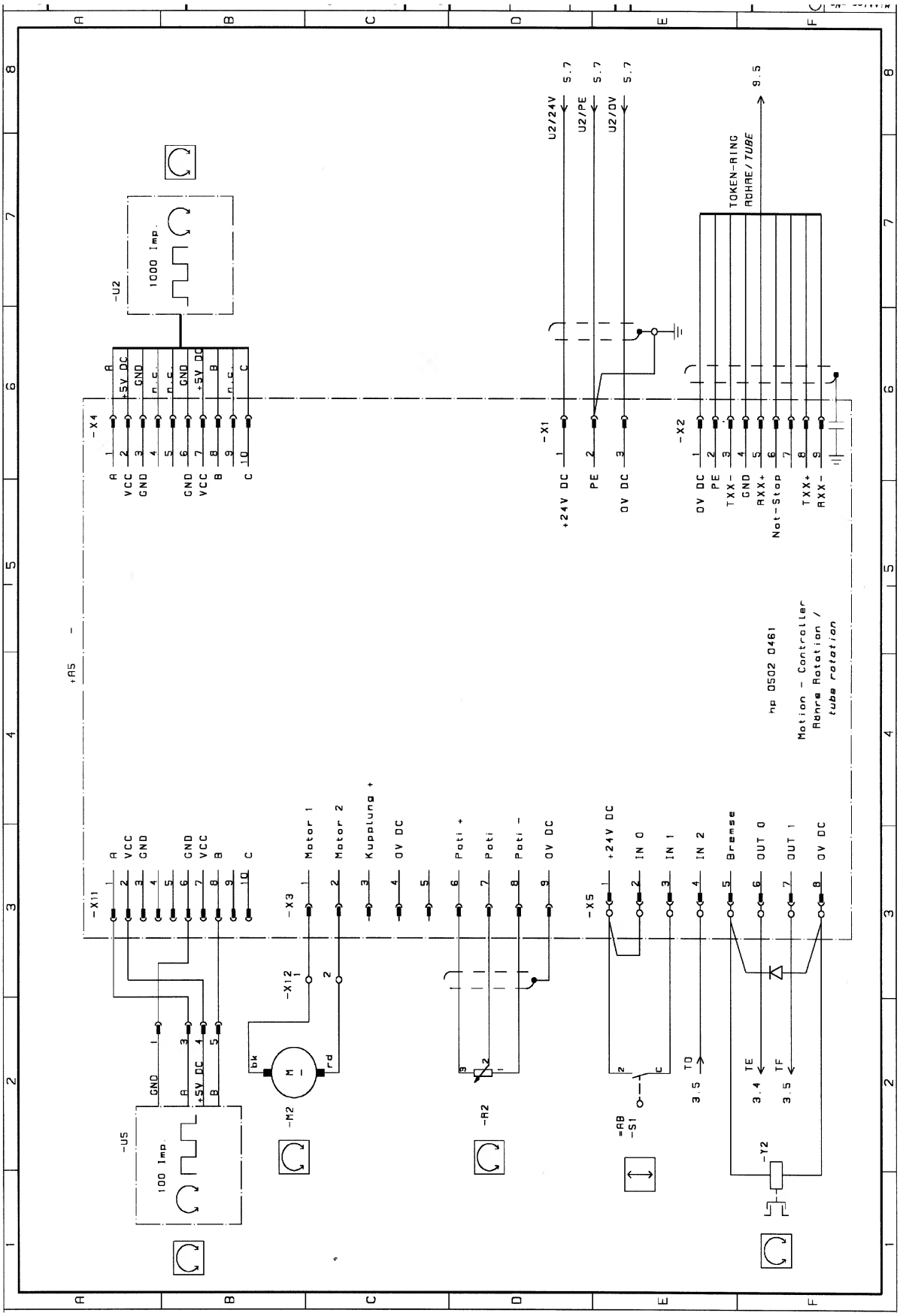
1.13 Schematics sheet 7 =AC Tube drive



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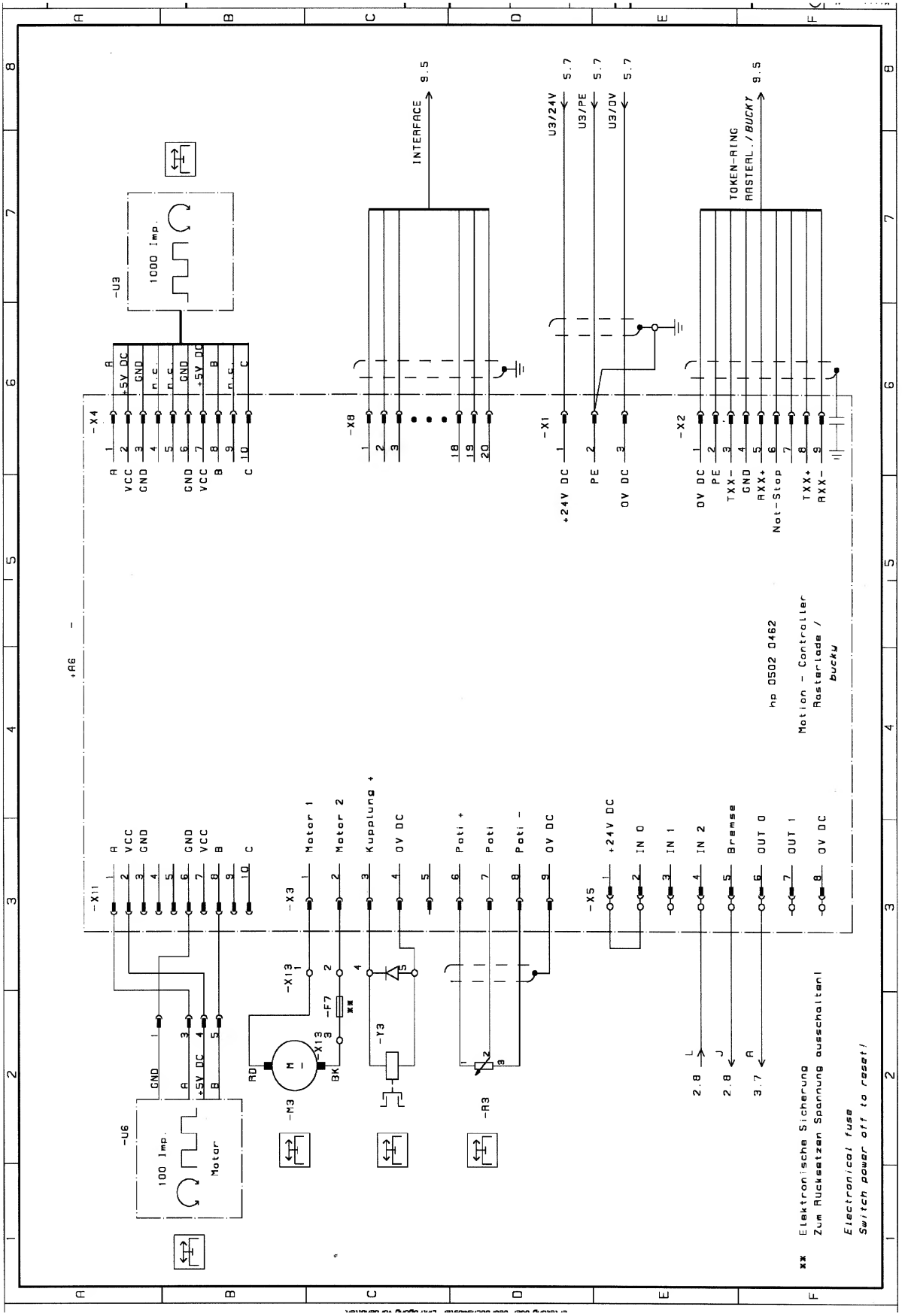
1.13 Schematics sheet 8 =AC Bucky drive



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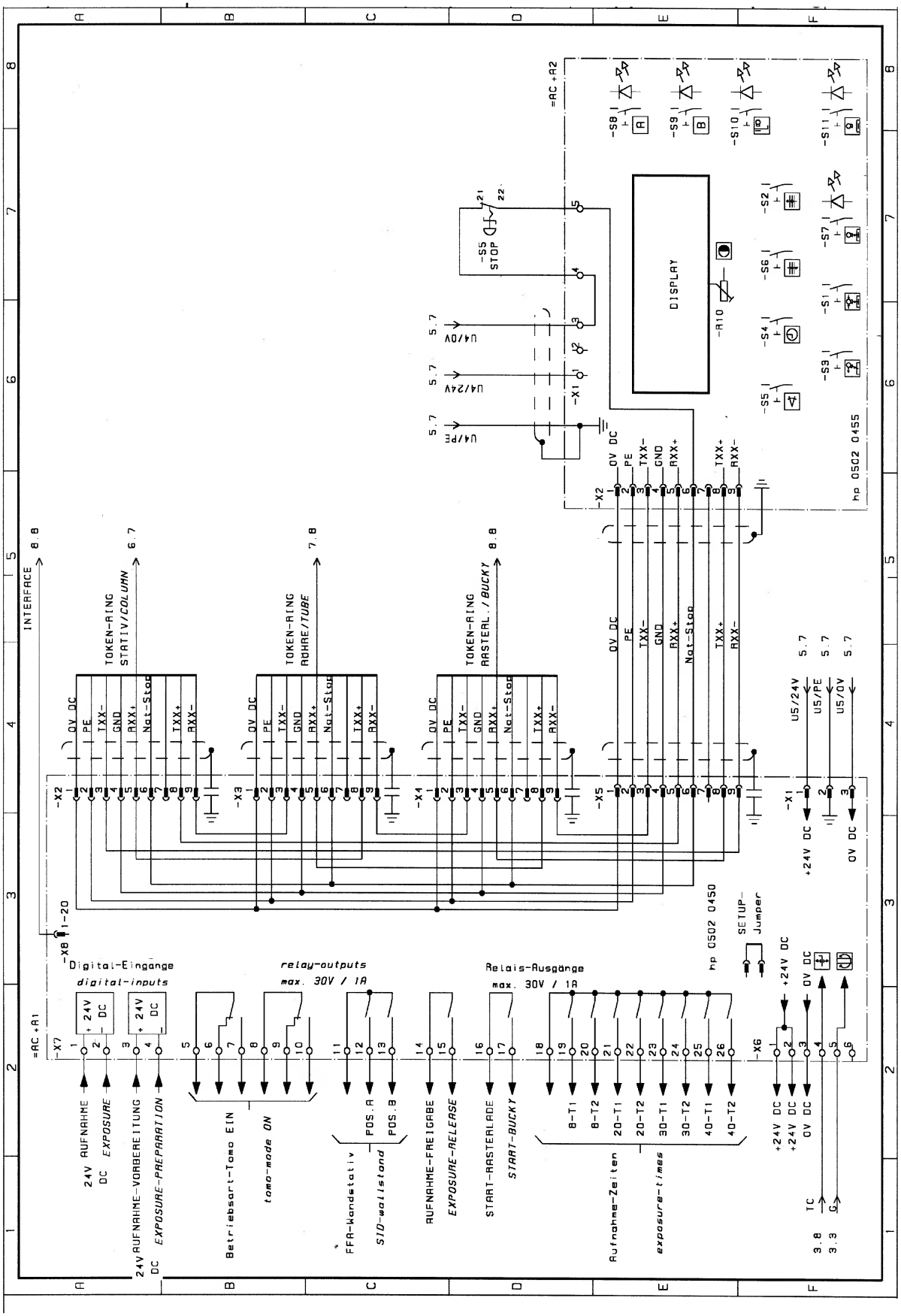
1.14 Wiring Diagram sheet 9 =AC Interface & Handcontrol



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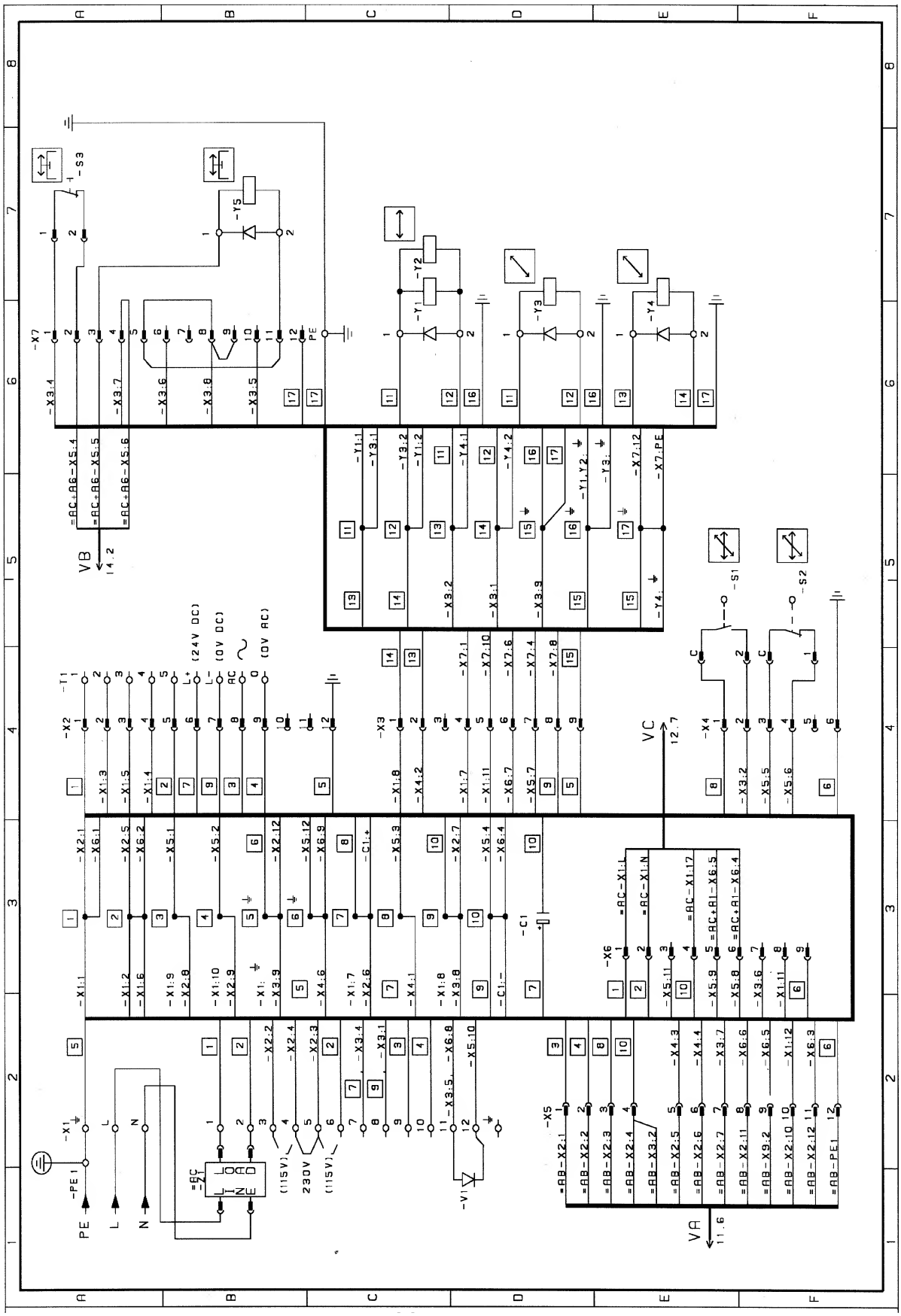
1.14 Wiring Diagram sheet 10 =AA Table



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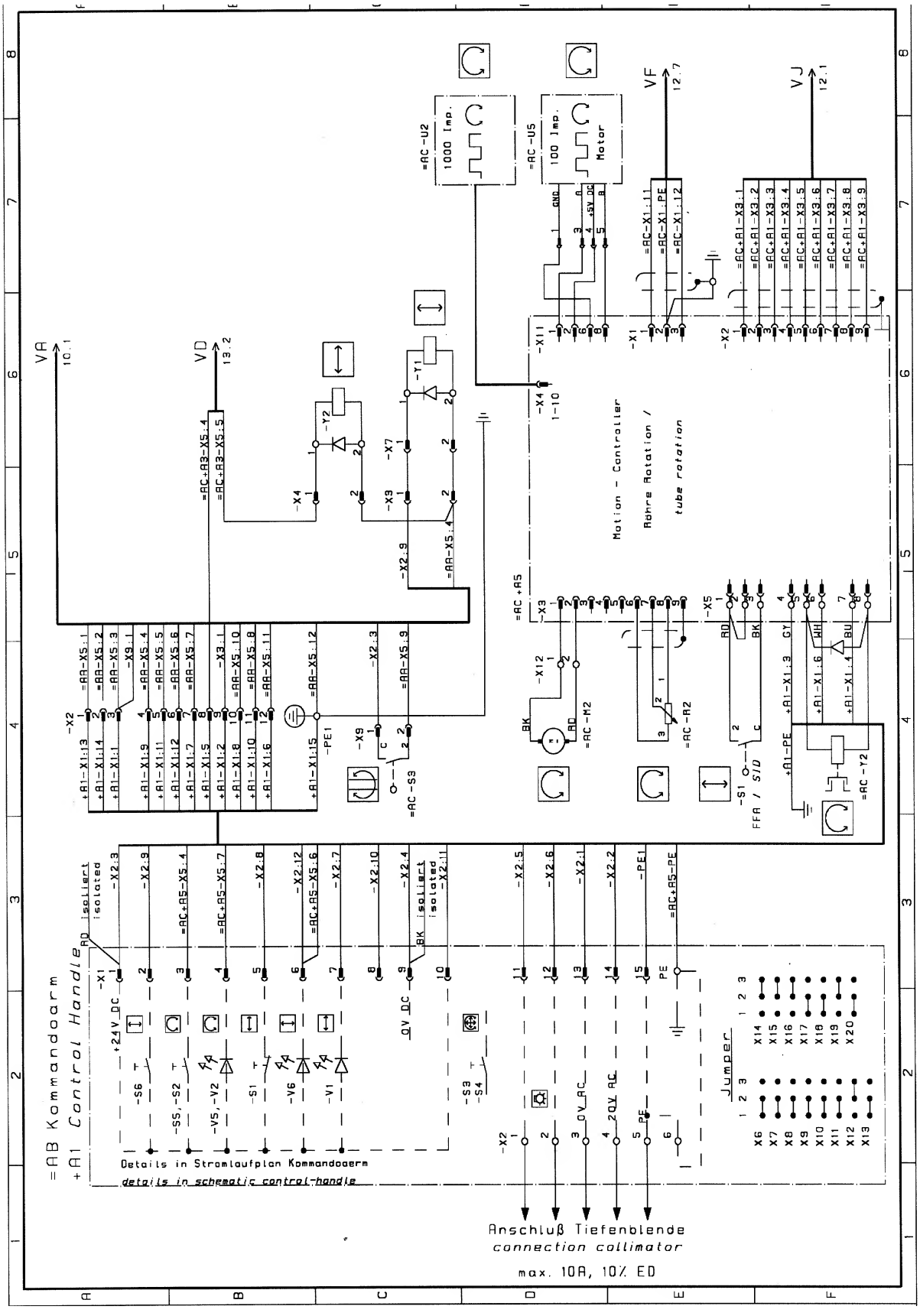
1.14 Wiring Diagram sheet 11 =AB Column, Tomo, Tube



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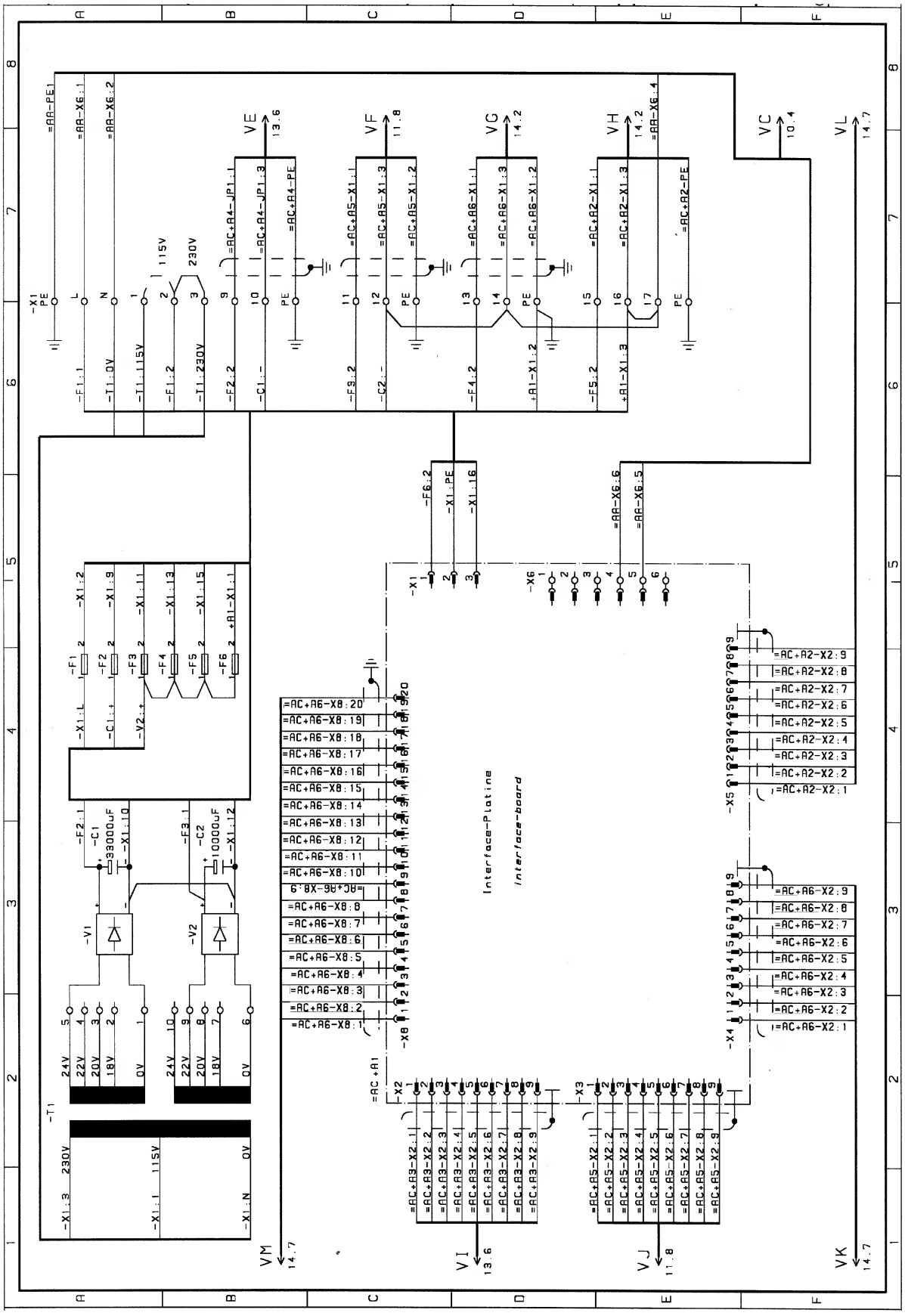
1.13 Wiring Diagram sheet 12 =AC Tomo interface



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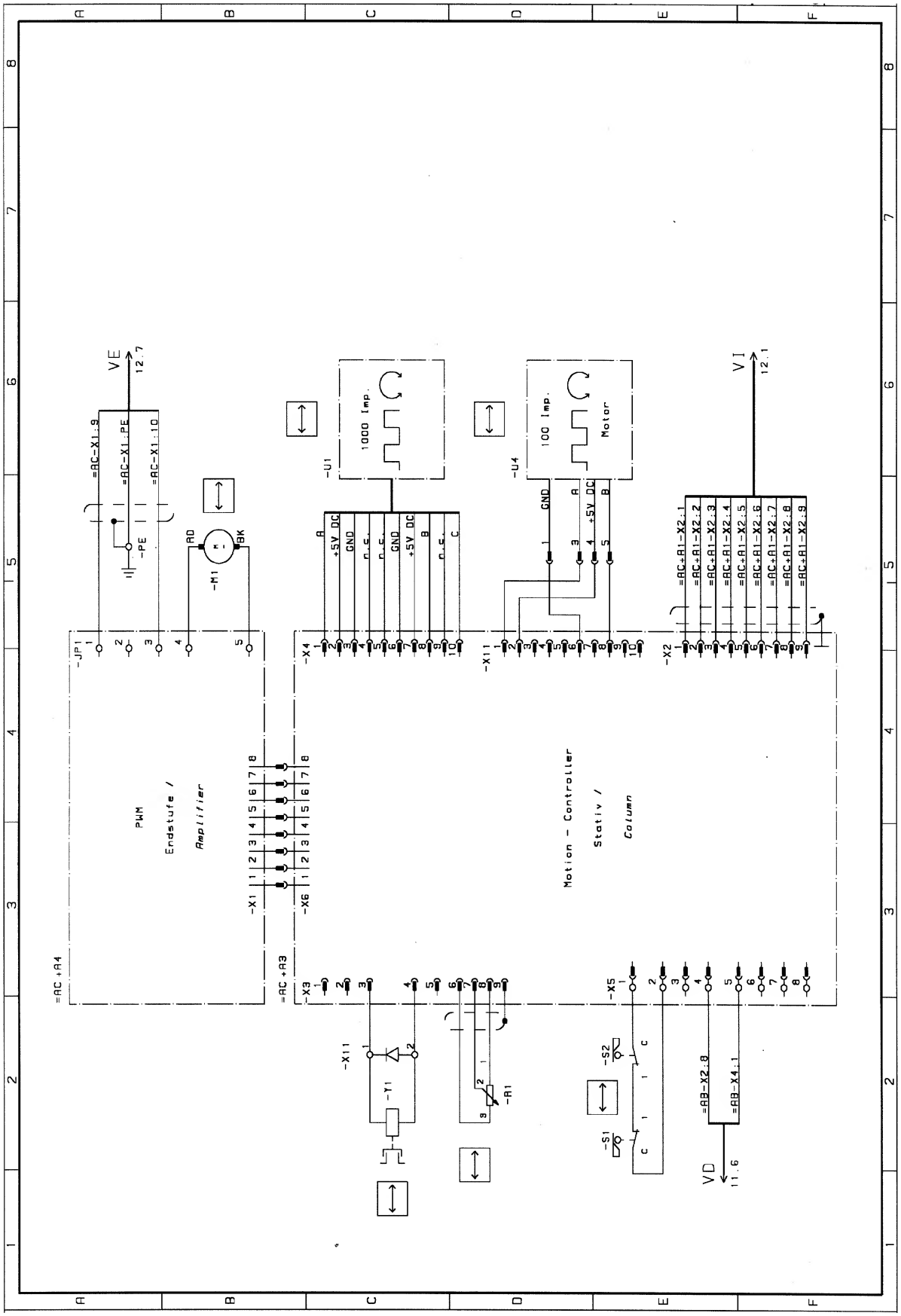
1.13 Wiring Diagram sheet 13 =AC Column, Tomo



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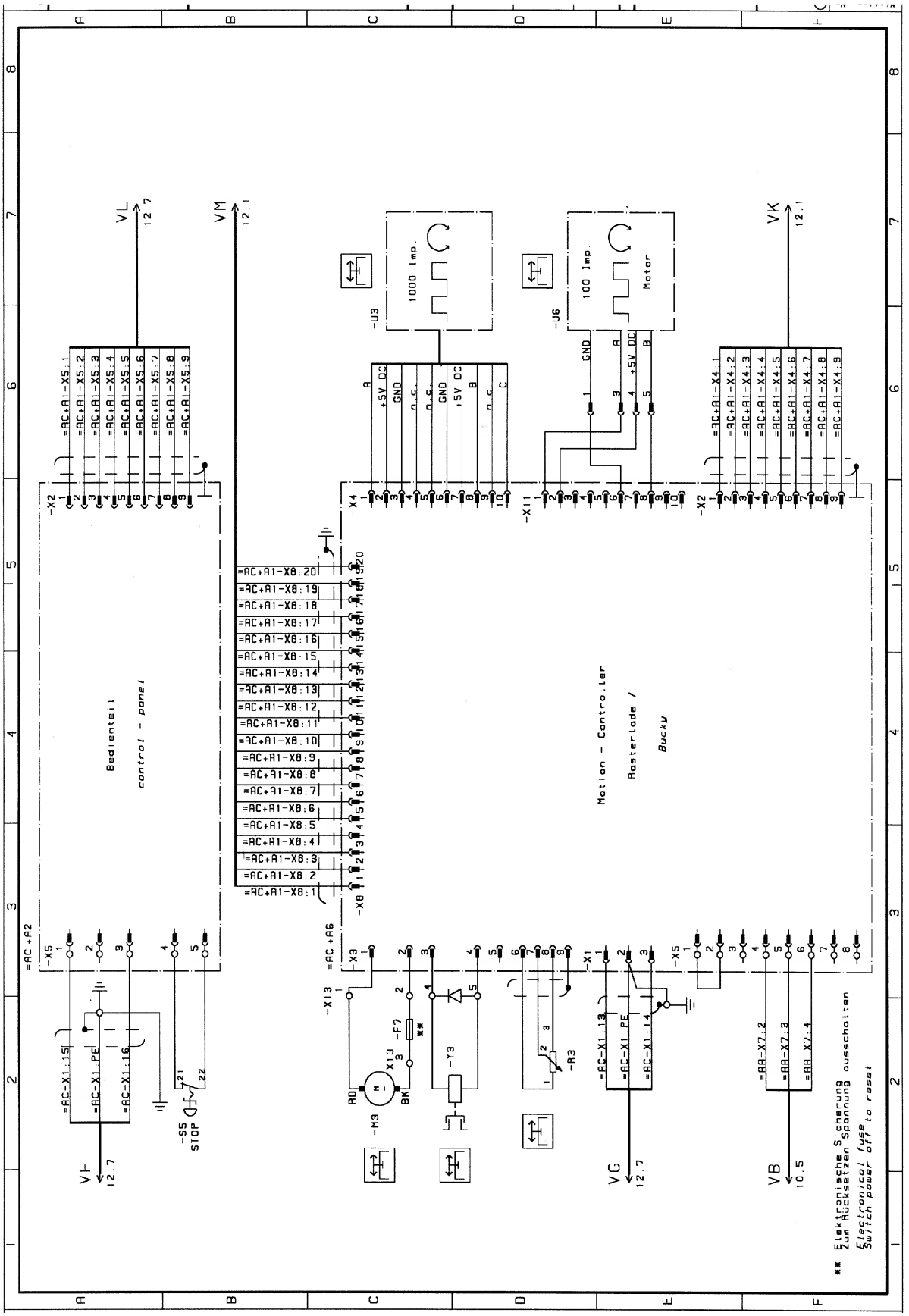
1.13 Wiring Diagram sheet 14 =AC Tomo, Bucky, Handcontrol



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1.14 Description of components for circuit diagram sheet 1

=AA- Table

=AA-C1 By-pass capacitor 24V DC

=AA-F1 Circuit fuse
=AA-F2 Fuse 24V DC
=AA-F3 Fuse 20VAC

=AA-PE1 Main Grounding bolt

=AA-S1 Foot control brake release table top
=AA-S2 Foot control for collimator light
=AA-S3 Switch release Bucky brake

=AA-T1 Mains transformer

=AA-V1 Uncoupling diode
=AA-X1 Terminal strip
=AA-X2 Plug in connection power pack
=AA-X3 Plug in connection brake solenoid table top
=AA-X4 Plug in connection foot control
=AA-X5 Plug in connection Column
=AA-X6 Plug in connection Tomo
=AA-X7 Plug in connection Bucky brake

=AA-Y1 Brake solenoid table top longitudinal
=AA-Y2 Brake solenoid table top longitudinal
=AA-Y3 Brake solenoid table top transverse left
=AA-Y4 Brake solenoid table top transverse right
=AA-Y5 Brake solenoid for Bucky brake

=AB- Stand

=AB+A1 Control Arm

=AB+A1-X1 Plug-in connection control arm
=AB+A1-X2 Terminal strip for collimator
=AB+A1-X3 Terminal strip for option

=AB+A1-S1 Switch for horizontal brake release
=AB+A1-S2 Switch for rotational brake release
=AB+A1-S3 Switch release all brakes
=AB+A1-S4 Switch release all brakes
=AB+A1-S5 Switch for rotational brake release
=AB+A1-S6 Switch for vertical brake release

=AB+A1-V1 LED Stand - Bucky centering
=AB+A1-V2 LED - rotation angle 0°, +/-90°
=AB+A1-V3 LED - option
=AB+A1-V4 LED - option
=AB+A1-V5 LED - rotation angle 0°, +/-90°
=AB+A1-V6 LED - vertical FFD

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1.14 Description of components for circuit diagram sheet 2

=AB-K1 Relay for optional SID

=AB-PE Main Grounding bolt Stand

=AB-S1 SID switch vertical

=AB-X2 Plug-in connection for tube support arm
=AB-X3 Plug-in connection for vertical brake
=AB-X4 Plug-in connection for horizontal brake
=AB-X5 Plug-in connection for collimator
=AB-X6 Terminal strip in the tube support arm
=AB-X7 Plug-in connection in vertical brake
=AB-X9 Plug-in connection for =AC-S3

=AB-Y1 Vertical brake
=AB-Y2 Horizontal brake

=AC Tomo
=AC +A1 Interface board

=AC +A1-X1 Plug connection power supply
=AC +A1-X2 Plug connection data wiring column
=AC +A1-X3 Plug connection data
=AC +A1-X4 Plug connection data wiring Bucky
=AC +A1-X5 Plug connection data control panel
=AC +A1-X6 Plug-terminal strip entrance
=AC +A1-X7 Plug-terminal strip interface signal
=AC +A1-X8 Plug connection / O signal to +AG

=AC +A2 Control panel

=AC +A2-X1 Plug-terminal strip power supply EMERGENCY-STOP
=AC +A2-X2 Plug connection data wiring
=AC +A2-R10 Adjustment resistor for display contrast

=AC +A2-S1 Switch prep.
=AC +A2-S2 Switch fulcrum up
=AC +A2-S3 Switch test run
=AC +A2-S4 Switch Tomo-time
=AC +A2-S5 Switch tomographic angle
=AC +A2-S6 Switch fulcrum down
=AC +A2-S7 Switch operating method Tomo
=AC +A2-S8 Switch Bucky Wall Stand A-Pos.
=AC +A2-S9 Switch Bucky Wall Stand B-Pos.
=AC +A2-S10 Switch operating method Bucky Wall Stand
=AC +A2-S11 Switch operating method table exposure

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1.14 Description of components for circuit diagram sheet 3

=AC +A3 Motion controller column

=AC +A3-X2 Plug connector data wiring
=AC +A3-X3 Plug connector clutch Potentiometer
=AC +A3-X4 Plug connector impulse sender
=AC +A3-X5 Plug terminal strip in-output
=AC +A3-X6 Plug connector for end...board
=AC +A3-X11 Plug connector motor impulse sender

=AC +A4 Amplifier board

=AC +A4-X1 Plug connector for motion controller
=AC +A4-JP1 Terminal strip power supply motor

=AC +A5 Motion controller tube

=AC +A5-X1 Plug connector power supply
=AC +A5-X2 Plug connector data wiring
=AC +A5-X3 Plug connector motor clutch Poti
=AC +A5-X4 Plug connector impulse sender
=AC +A5-X5 Terminal strip in-output
=AC +A5-X11 Terminal motor impulse sender

=AC +A6 Motion controller Bucky

=AC +A6-X1 Plug connector power supply
=AC +A6-X2 Plug connector data wiring
=AC +A6-X3 Plug connector motor clutch Poti
=AC +A6-X4 Plug connector impulse sender
=AC +A6-X5 Terminal strip in-output
=AC +A6-X8 Plug connector I / O signal to +A1
=AC +A6-X11 Plug connector motor impulse sender

=AC -C1 Capacitor
=AC -C2 Capacitor

=AC -F1 Fuse primary
=AC -F2 Fuse tube stand drive
=AC -F3 Fuse tube drive
=AC -F4 Fuse Bucky drive
=AC -F5 Fuse control panel
=AC -F6 Fuse interface

=AC -T1 Transformer
=AC -Z1 Filter

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1.14 Description of components for circuit diagram sheet 4

=AC -V1	Rectifier
=AC -V2	Rectifier
=AC -M1	Drive motor column
=AC -M2	Drive motor tube
=AC -M3	Drive motor Bucky
=AC -R1	Potentiometer column
=AC -R2	Potentiometer tube
=AC -R3	Potentiometer Bucky
=AC -S1	Security end switch column
=AC -S2	Security end switch column
=AC -S3	Switch column not turned
=AC -S5	Switch NOT STOP
=AC -X1	Terminal strip Tomo control
=AC -X11	Terminal strip clutch column
=AC -X12	Terminal strip motor tube
=AC -X13	Terminal strip motor, clutch Bucky
=AC -U1	Impulse sender column
=AC -U2	Impulse sender tube
=AC -U3	Impulse sender Bucky
=AC -U4	Impulse sender motor impulse sender column
=AC -U5	Impulse sender motor impulse sender tube
=AC -U6	Impulse sender motor impulse sender Bucky
=AC -Y1	Motor clutch column
=AC -Y2	Motor clutch tube
=AC -Y3	Motor clutch Bucky

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2. Mounting

2.1 Preparing the Floor

Drill holes for the floor mounting of the equipment as shown in dimensional drawing, sheet 6, with a 12 mm/.472 in. drill.
To ensure full range motion of the system components, keep the minimum distances as indicated.
The bolts must be suitable for 2500 N tensile stress at each mounting point. E.G. Liebig security anchors S12/65 N for B 150 DIN 1045 concrete floor.
Remove the vinyl or carpet floor covering around the mounting points for the base of the unit.
Lay floor covering shims (installation material, included with the shipment) of the same thickness as the original floor covering at the mounting points.

2.2 Unpack equipment parts

Remove table from the palette.

In addition:
Remove both trim plugs (Fig. 1 Pos. 1) and loosen beneath the socket head cap screw. Tilt front plate „above“ (Pos. 2) carefully to the outside and then take out from underneath. Take out accessory box from the table.

Fig. 1

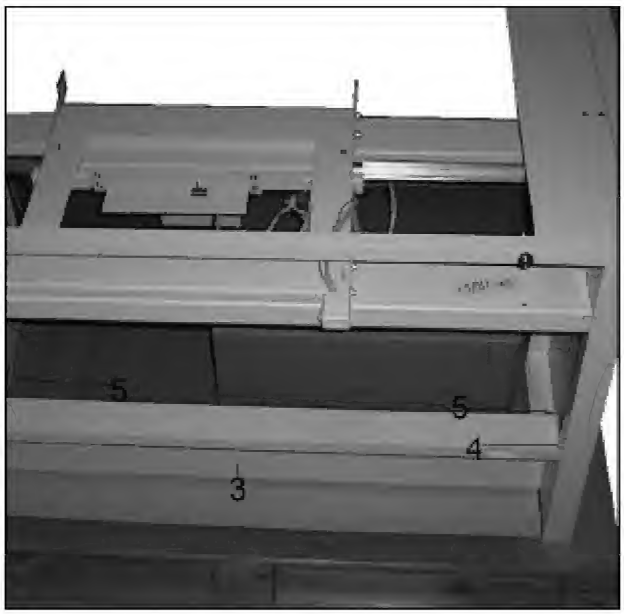

Fig. 2

Dismount the lower table cover (Fig. 2/Pos. 3) with both screws (Pos.4). Loosen both transport screws (Fig.2/Pos. 5) from the palette and push to the bottom.
Push the table to the back from the palette (Fig. 3). Tilt table to the back, pull out palette to the front and take off the table carefully.

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Fig. 3

Fig. 4

Remove both covers (Fig. 4/Pos. 7 and 8) and loosen the transport security screws of the rail stand, then push to the bottom. Remove rail stand from the palette and take to the assembly area. Dismount transport security plates of the column. (Leave column on the palette until assembly). Unpack equipment parts and check for completeness according to shipping list respectively order. Check complete delivery upon damage before assembly start.

2.3 Assembly of the table and rail stand

Take the table to installation point. Place the rail stand behind the table. Align the rail stand (Fig. 5/Pos.9) to the right or left side of the table (Pos. 10) depending on the way of assembly (according to drawing for installation of a Bucky wall stand left or right).

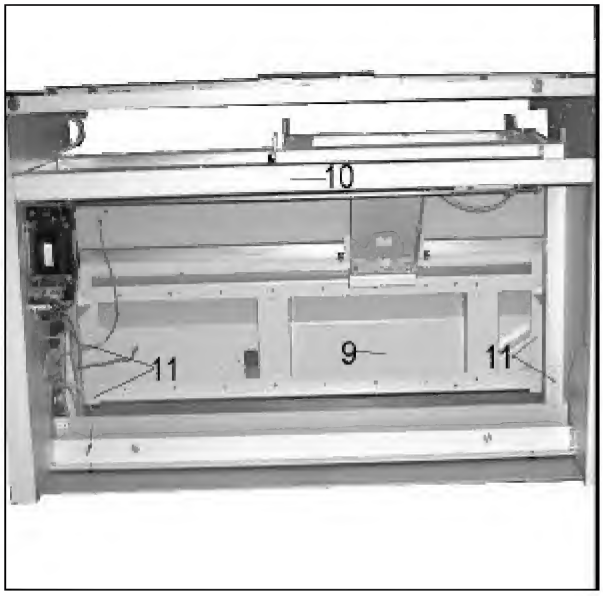

Fig. 5

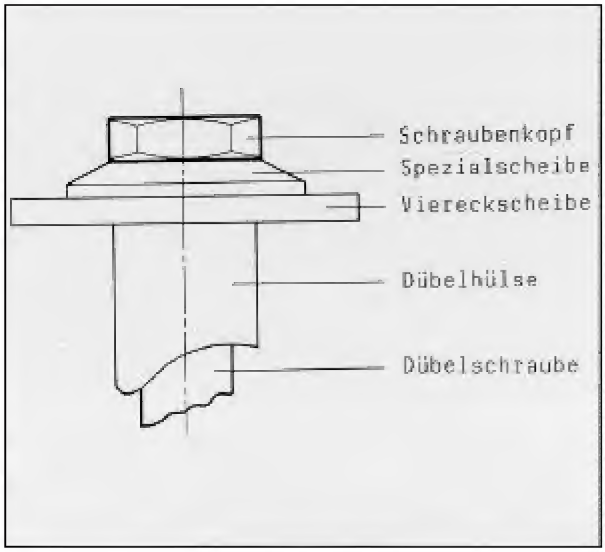

Fig. 6

Fasten the rail stand with 4 screws (Pos. 11) to the table. Push table with rail stand over the fastening bore-holes at the assembly place. Respectively align the table at the assembly

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place, mark the 5 fastening bore-holes and bore. Insert the included set pin (Fig. 6) and insert screws and washers.

Fig. 7

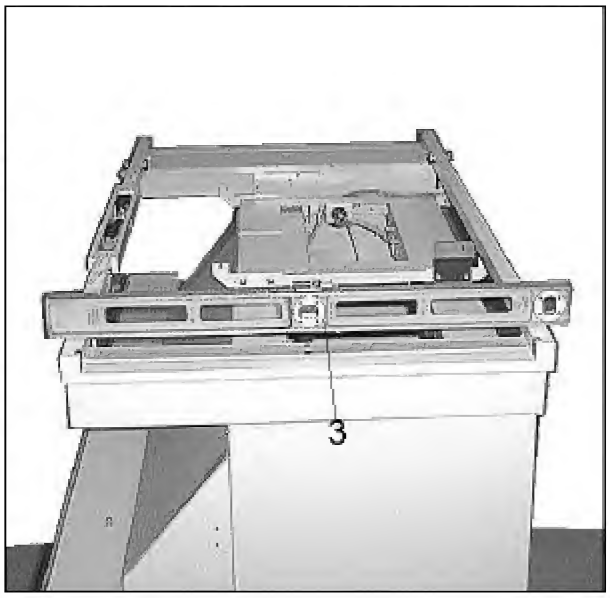

Fig. 8

Align table with rail stand according to liquid level (Fig. 7 Pos. 1,2 and Fig. 8/Pos. 3). If necessary, align with washers (Fig. 9/Pos. 4 and 5). Fasten all screws tightly.

Fig. 9

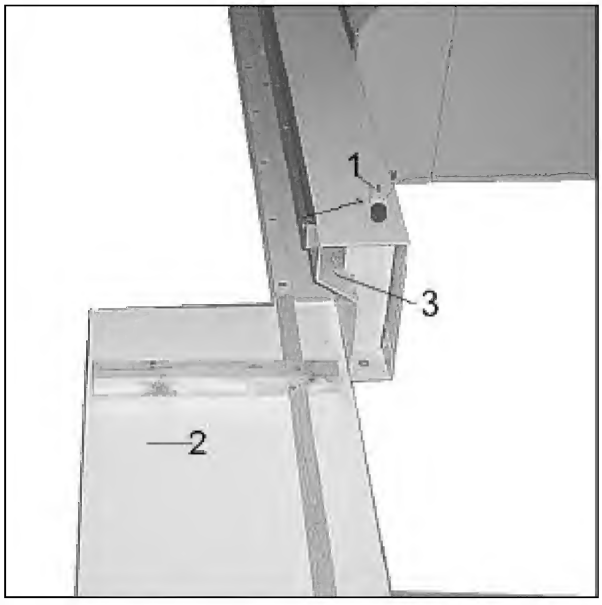

Fig. 10

2.4 Assembly of the column

The column will be shipped with the counterweights in place. The counterweight in the column is secured for the transport with two screws.

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Attention:
Do not remove the security bolts before assembly of the tube and collimator.

To insert the column into the rail stand easily, an assembly plate is included to the shipment. It is constructed so that it can slide on a normal floor easily.
Dismount limit stop (Fig. 10 Pos. 1) from the rail stand.
Set up (Fig. 11/Pos. 1) and place on the assembly plate (Pos. 2). Push the assembly plate to the rail stand and align (Fig. 11/Pos. 2). Insert the column from the assembly plate into the rail stand.

Remark:
When inserting pay attention the bearing and brake magnet.

Mount the limit stop (Fig. 10/Pos. 1) again to the rail stand.

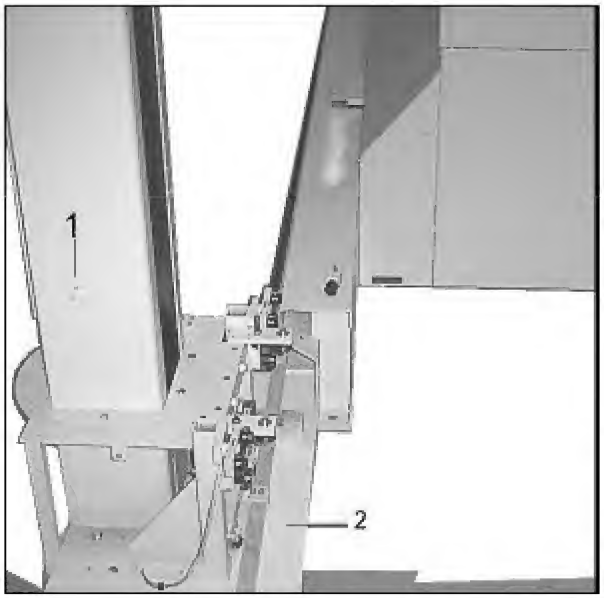

Fig. 11

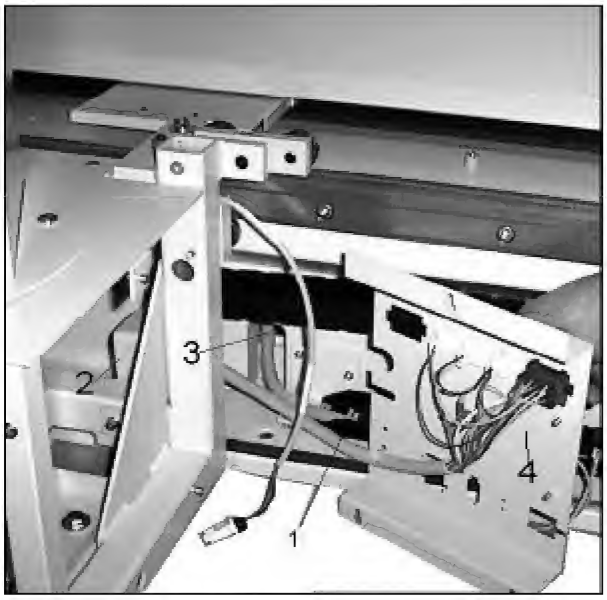

Fig. 12

Mount the cable guide chain (Fig. 12/Pos. 1) to the rail stand - back wall - and to the column carriage (Pos. 2). Insert the end of the cable (Pos. 3) into the table. Mount the distributing plate (Pos. 4) to the column carriage.

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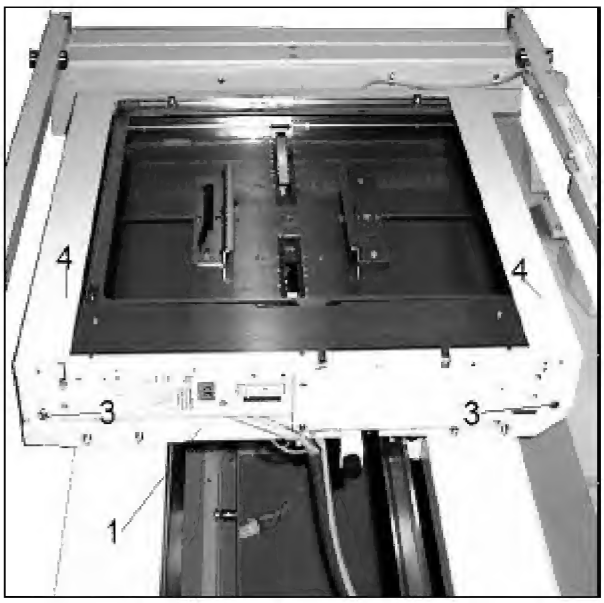

Fig. 14

2.5 Assembly of Bucky

Remark:
Buckys of different manufacturers can be installed. The equipment will be prepared according to the customer order and the necessary fastening materials will be included to the shipment.

Insert the Bucky (opening of cassette to the front) in the Bucky carriage (Fig.14/Pos.1).

Install connection cable and detector cable according to the instructions of the manufacturer.

Bucky P
Fastening with 2 screws each (Fig. 14/Pos. 3) left and right lateral. Put at the top the cover angle with the longer side (Fig. 14/Pos. 4) to user- and back side and fasten above with 3 screws each and U-washer.

Philips
Fastening with 2 screws (Fig. 14/Pos. 3) left and right lateral. Put at the top the cover angle with the longer side (Fig. 14/Pos. 4) to user- and back side and fasten above with 3 screws each.

Siemens
Fastening with 2 screws each (Fig. 14/Pos. 3) left and right lateral.

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2.6 Assembly of the table top

Remark:
If there is less than 2900 mm from the mid of table to a wall available, please mount the table plate according to section 2.6.1.

Remove table plate out of packing.
Dismount on one grinding the limit stop (Fig. 18/Pos. 1) and push the table top (Fig. 15/ Pos. 2) on the transverse carriage.

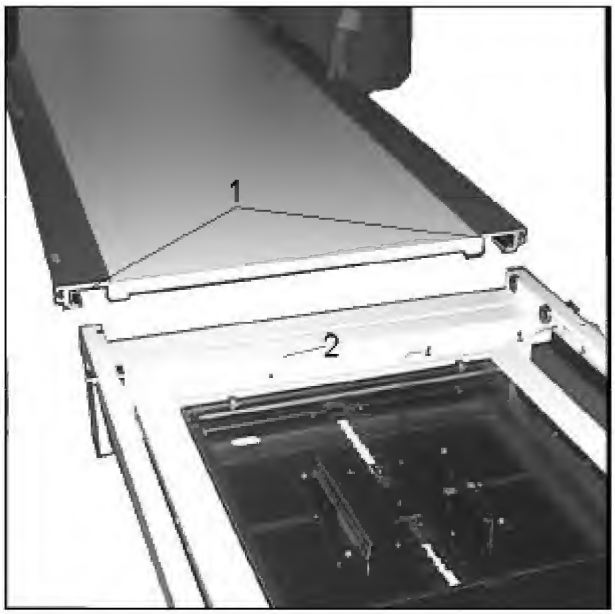

Fig. 15

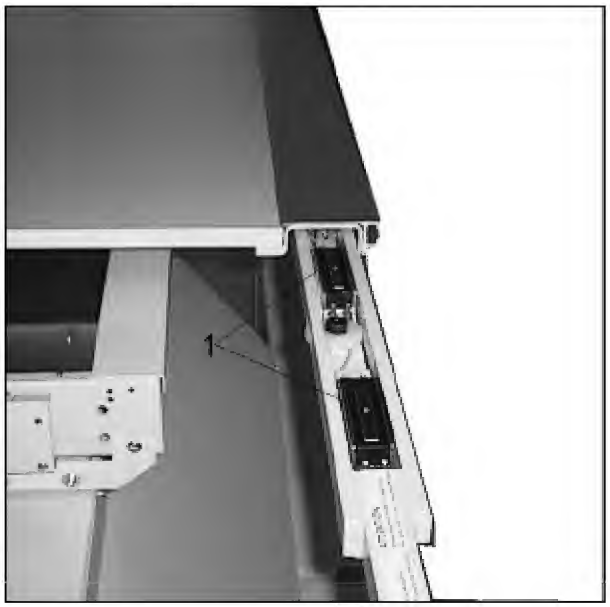

Fig. 16

Attention:
Pay attention to the brake magnets while inserting the table top.

Remount limit stops (Fig. 18/Pos. 1)

Put the included card board of the table top packing on the table top during assembly to avoid any damages.

2.6.1 Assembly of the table top in small rooms

Dismount on both grindings the limit stops Fig. 18/Pos. 1). Dismount the bearings (Fig. 17/Pos. 1 and 2) which are in the front.

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Fig. 17

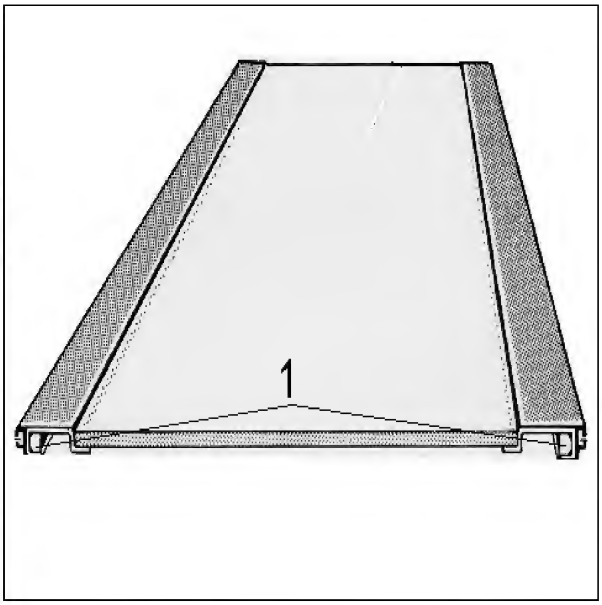

Fig. 18

Put the table top on the table frame and lift the table top on the user side about 45°. Put meanwhile the table top rail from behind over the Polyamid roll and bearings. Lower the table top carefully. Move the table top longitudinal and remount the dismounted bearings. Readjust the regulations of the eccentric. Remount the limit stops (Fig. 18/Pos. 1).
Put the included pasteboard of the table top packing on the table top during assembly to avoid any damages.

2.7 Assembly of the tube and collimator

Siemens

Dismount the intermediate ring (Fig. 19/Pos. 59). Mount the window flange (Pos. 58) between the adjusted flange at the factory (Fig. 19/Pos. 57) and mount to the tube housing.

Collimat

Dismount the intermediate ring (Fig. 20/Pos. 1) out of the collimator (Pos. 2). Mount the window flange (Fig. 20/Pos. 3) with the control arm to the tube housing. Put the collimator (Pos. 4) onto the intermediate ring (Pos. 5) and fasten with fixing plates.

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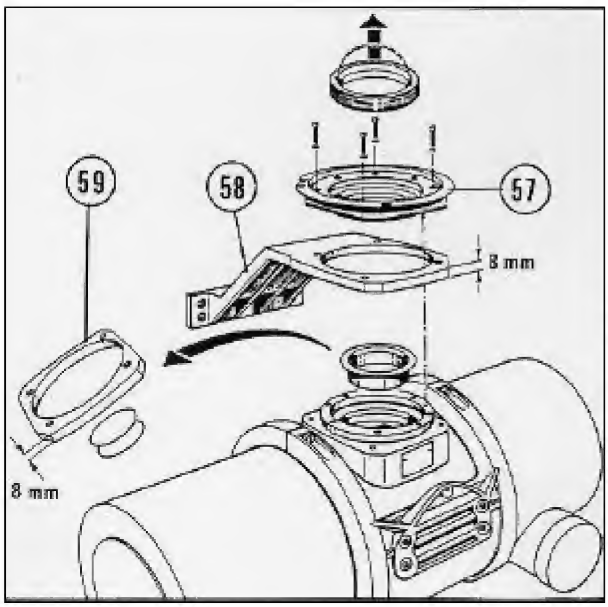

Fig. 19

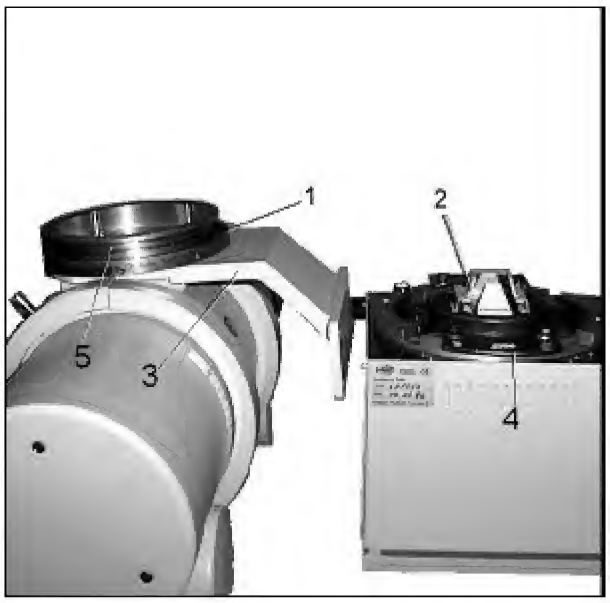

Fig. 20

Philips

Mount the control arm with the Z-angle (Fig. 21/Pos. 1) to the Rotalix.

Other manufacturer

Fasten the control arm (Fig. 22/Pos. 1) with the window flange (Pos. 3) onto the tube housing and mount the collimator.

USA version

Mount the control arm (Fig. 22/Pos. 1) with the support angle (Pos. 2) between tube housing and collimator.

Fig. 21

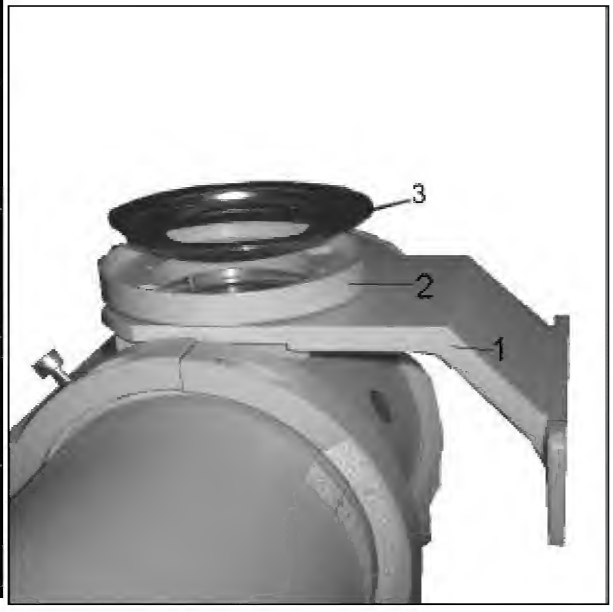

Fig. 22

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2.8 Assembly of the tube holding support

Remove the above screws (Fig. 23/Pos. 1) and loosen the lower screws (Pos. 2) approx. 10 mm. Remove the cover of the tube holding support (Fig. 25/Pos. 1).
Put the tube holding support to the carriage support and insert the cable for the SID switch (Fig. 24/Pos. 3) in the tube holding support. Put in over the lower screws and fasten with the upper screws (Fig. 24/Pos. 1) the tube holding support to the vertical carriage.

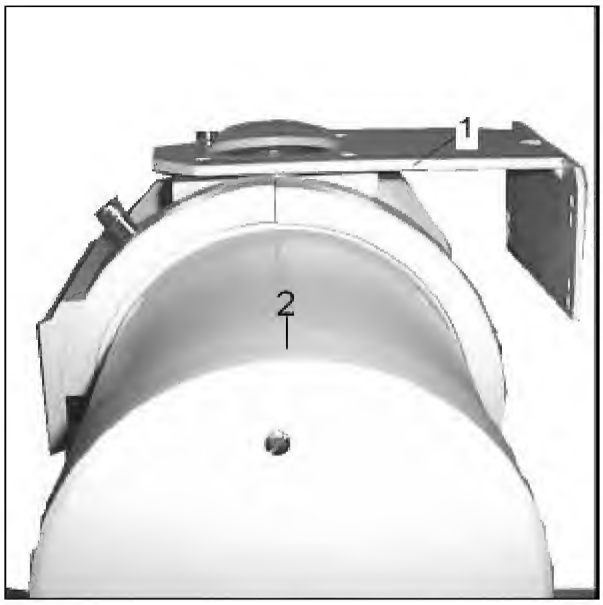

Fig. 23

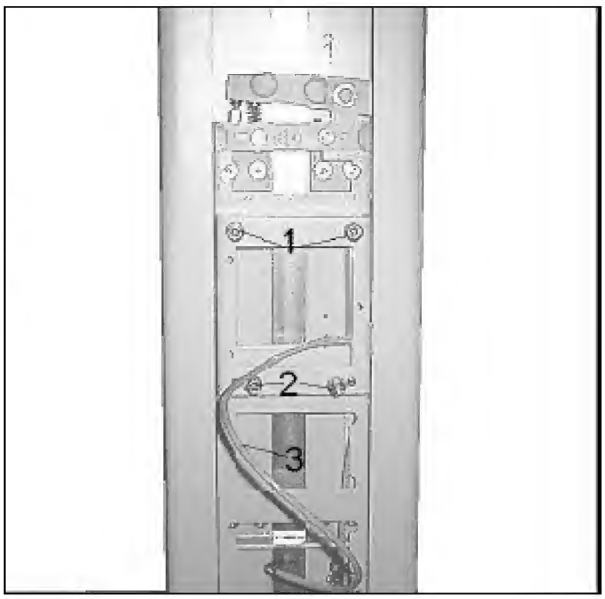

Fig. 24

Fasten the lower screws (Fig. 24/Pos. 4). Lift the tube holding support slightly, then push on safety brake (Fig. 26/Pos. 1) and lower the tube holding support slowly.
Tighten the rope and the tube holding support is suspended to the rope. Install cable for SID switch in support arm.

2.9 Assembly of the tube on tube holding support

Move the center gravity of the tube/collimator/control board unit into the rotation axis by displacing the unit vertically (in direction of x-rays) on the compensating plate (Fig. 25/Pos. 1). Insert spacer plate (Pos. 2) if necessary.

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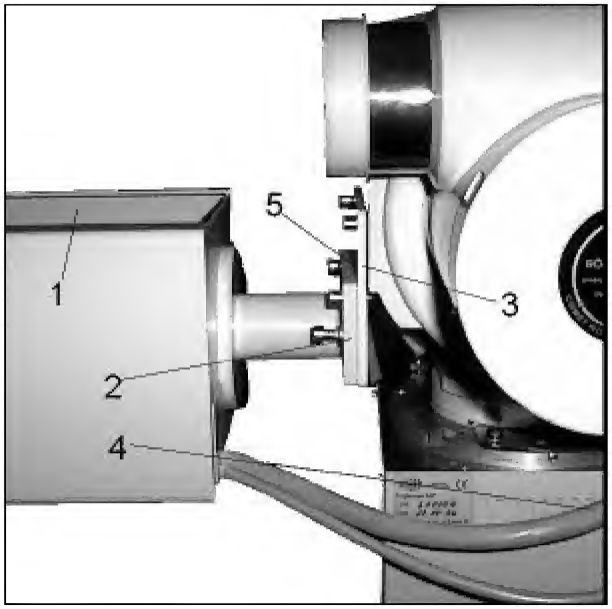

Fig. 25

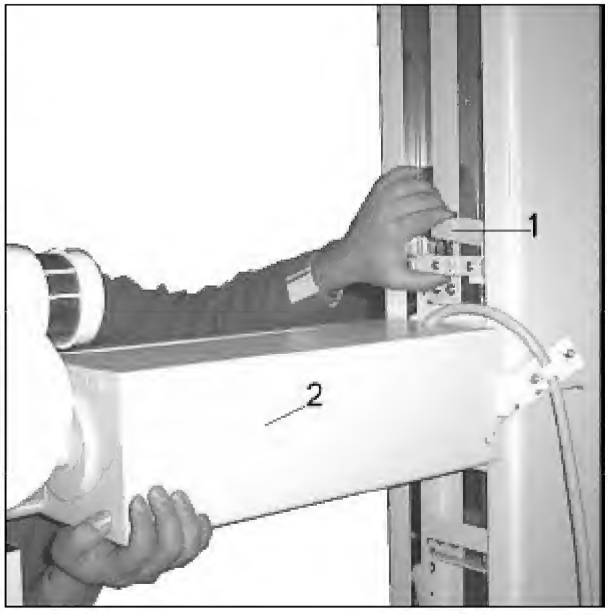

Fig. 26

Note: The compensating plate must be installed as distance plate, even if the center of gravity lies in the rotation axis.

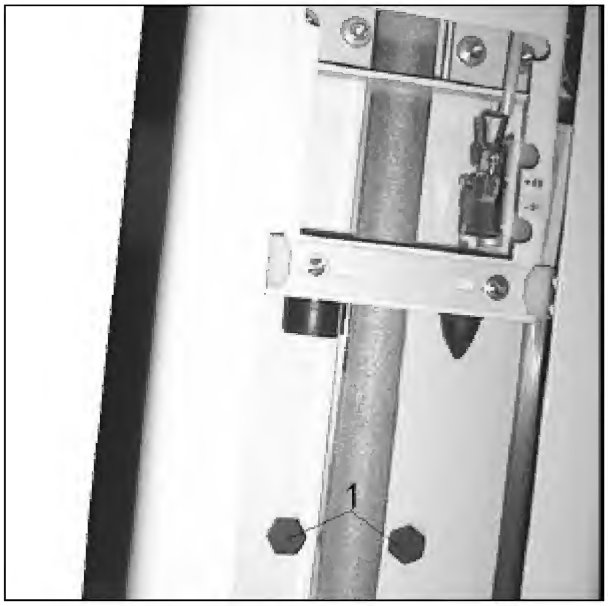

Fig. 27

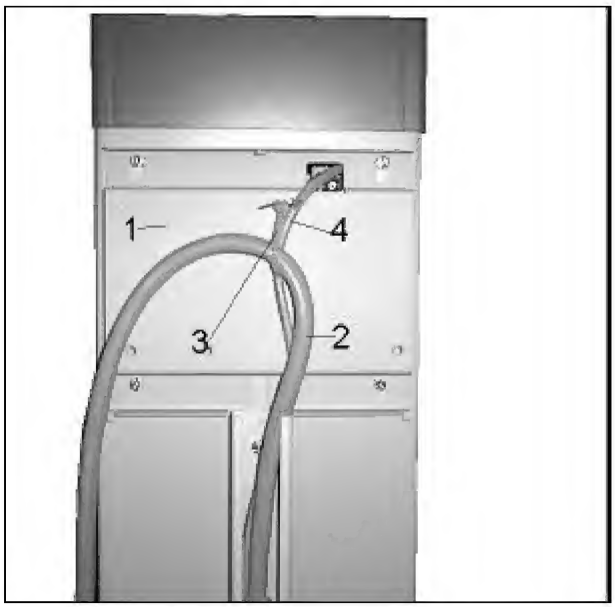

Fig. 28

Remove transport security screws (Fig. 27/Pos. 1) and insert in the head part the nuts (Fig. 31 /Pos. 1).

2.10 Assembly of the control arm

Dismount the cover (Fig. 30/Pos. 1) on the control arm (Pos. 2). Remove the 4 screws (Pos. 3) and mount the cover onto the control arm fastening. Cut in the cable (Fig. 25/Pos. 3) into the control arm and bring it to the cover. Then fasten with the 4 screws (Pos. 3).

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2.11 Assembly and installation of the cable

Mount the cable box (Fig. 28/Pos. 1) to the head of the column. Remove the cover of the cable tunnel. Insert the cable in the cable trough (Pos. 2) on the backside of the column. Screw down the cable collar in the cable tunnel (Fig. 29/Pos. 1). Plug in the plugs in the distributor plate (Fig. 12/Pos. 4). Tighten the cable to the cable box (Fig. 28/Pos. 1) and fasten with cable binder (Pos. 2). Install cable for vertical brake and earth cord in head part. Put cover onto the cable tunnel. Install the high-voltage cable to the tube. Place cable over the cable collar of the vertical carriage to the cable box on the backside of the column.

Fig. 29

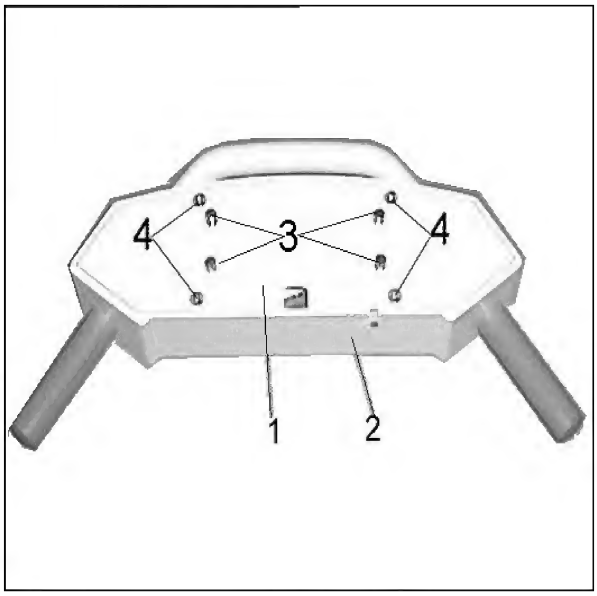

Fig. 30

Leave running loose cable next to wall terminal box or ceiling terminal box (option). Continue running the cables to the x-ray generator, install according to the installation plan of the x-ray generator.

2.12 Counterweight on the column

The tube holding support must be counterbalanced with the installed cables. Loosen brake and check the counterweight. If there is a ascending force of the tube holding support remove weight plates out of the counterbalance box.
If there is a descending force of the tube holding support put in weight plates in the counterbalance box.

Note:
Determine the weight difference with the spring balance. Drive column beside table and pull the tube holding support to the bottom. Secure counterbalance box with the security screw Fig. 28/Pos. 1). Lift the tube holding support (Fig. 26/Pos. 2) some cms. The tube holding support is suspended in the falling brake and the robe is not fixed.

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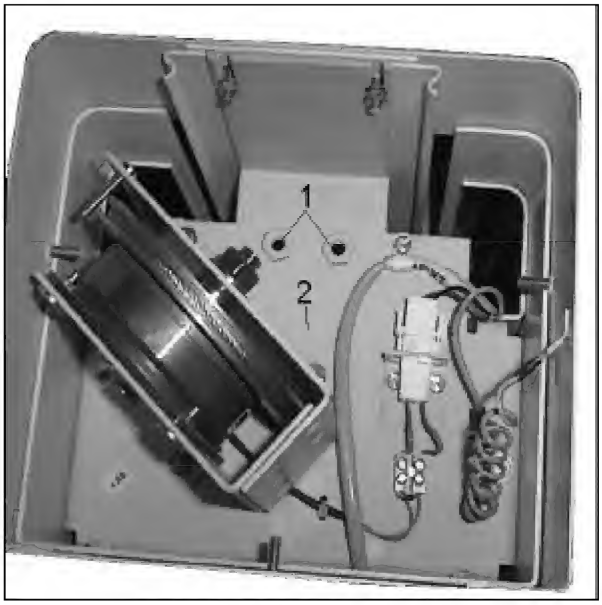

Fig. 31

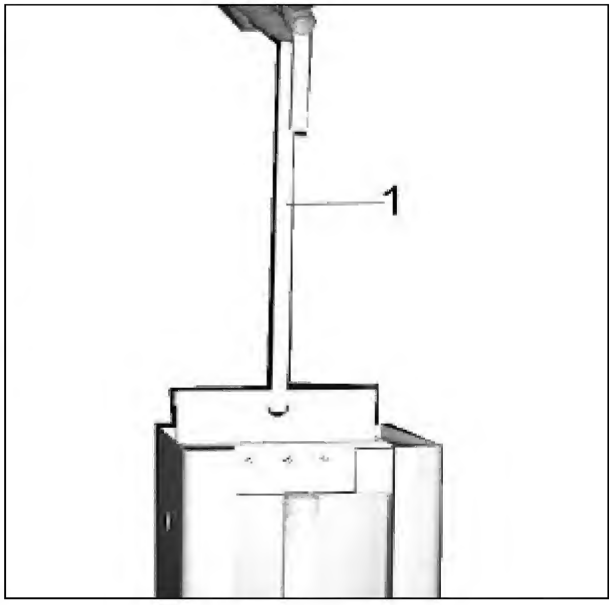

Fig. 32

Lift the head part (Fig. 31/Pos. 1) with the rope pulley and secure with a cord. Balance the calculated weight difference. Remount the head part.

Push the tube holding support slightly to the falling brake (Fig. 28/Pos. 1) and lower slowly the tube holding support.

2.13 Mounting of column drive motor

Install both cables from the distributing plate between transverse bracket and tube stand and connect with cable binder on below transverse bracket. Mount the end switch to the column carriage and cable. Fasten the motor assembly for column (Fig. 36/Pos.3) to the column carriage (Pos.1). Fasten each end of the belt (Pos.4) of both sides to the rail stand (Pos. 5). Determine the power of the belt as follows:
Apply spring balance in the middle of the rail stand to reach with 30 N force a deviation from the straight line of 2 cm. Can be adjusted on the right end of the rail stand with the tension screw.
Mount control board (Fig. 35/Pos.2 to the column carriage (Pos. 1).
Connect both connection cables, motor cable and the impulse sender cable.

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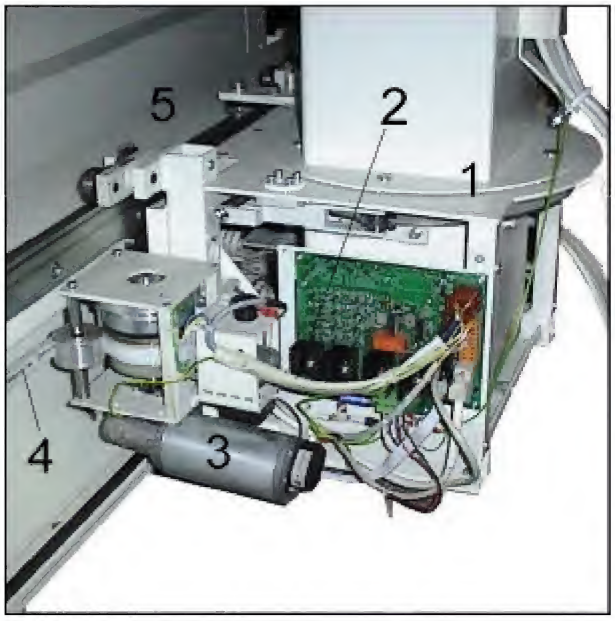

Fig. 35

Fig. 36

2.14 Starting of Tomo

Attention:
When mounting a Bucky Wall Stand right hand please install software before switching-on the equipment. Please follow chapter 3.9.

When switching on the unit it checks automatically after initialization of the control to duck that all axis are in zero position. The axis will correct themselves in millimeter range, if they are not on the rotation resistor index but in near to the zero point. A preparation drive is required as soon as the zero point range has been left to ensure that in case of overflow of the index marks in the zero position the indicators will be set accordingly. In this case all three operating methods SIDs on the control handle will flash on and the preparation drive will be activated while pushing the PREP-switch. After that the unit will be in table mode. Do not push the Emergency-STOP while performing the drive and adjust the vertical first draw SID to avoid any collision.

Control panel instructions

Power Switching- on

Initialization

searching index

searching index
press PREP key

searching index
reset emergency-stop

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searching index
center column.

Table mode

table exposure

table exposure
reset emergency-stop

Wall mode

SID wall stand
A= xxx cm B= xxx cm
A=xxxinch B=xxxinch

SID wall stand
reset emergency-stop

SID wall stand
center column

SID wall stand
adjust vertical SID

SID wall stand
rotate column

Tomo mode

tomo-preparation
press PREP key

tomo-preparation
reset emergency-stop

tomo preparation
center column

tomo preparation
adjust table height

tomo preparation
adjust vertical SID

tomo preparation
rotate column

angle time height
xxdeg x.xsec xx.xcm

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test run
xxdeg x.xsec xx.xcm

exposure preparation
xxdeg x.xsec xx.xcm

ready for exposure
xxdeg x.xsec xx.xcm

exposure
xxdeg x.xsec xx.xcm

2.15 Function control

Switch in x-ray generator and check all functions. If necessary perform corrections according to chapter 3. Adjustment.

2.16 Assembly of covers

Mount the lower table cover (Fig. 37/Pos. 1), connection part and upper cover (Pos.2). Put in the front plate (Fig. 38/Pos. 1) with the bracket (Pos. 3) in the slot (Fig. 37/Pos. 3). Fasten carefully onto table frame with both (Fig. 37/Pos. 4) socket head cap screw. Lock both bore holes (Fig. 37/Pos. 4) with the artificial cap.

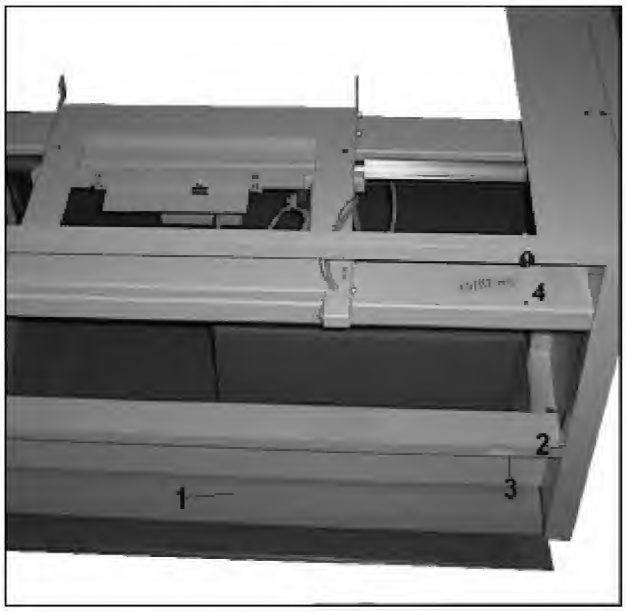

Fig. 37 Fig. 38

Drive vertical carriage to the head side and insert lower center cover (Fig. 39/Pos. 1). Drive vertical carriage carefully down.

Attention:
The lower center cover has to be guided from the coulisse. Stick the upper center cover (Fig. 39/Pos. 2) to the lower center cover (Pos. 1).

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Stick the upper middle cover (Fig. 39/Pos. 2) onto the lower middle cover (Pos. 1).
Drive the vertical carriage to the head side and fasten the center cover with the front border.

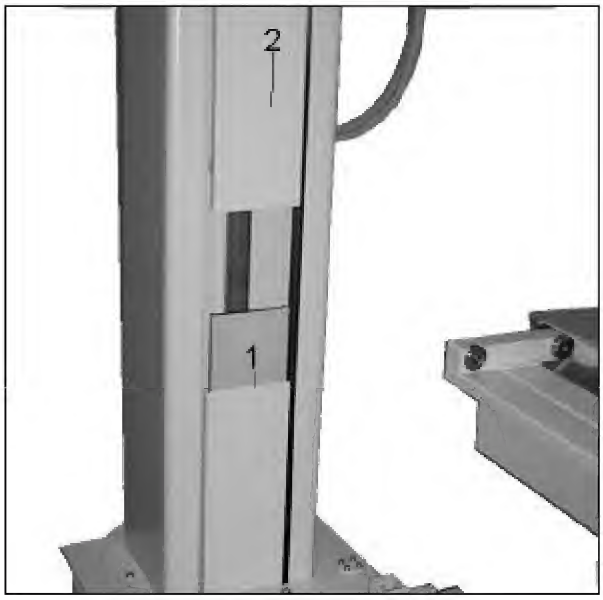

Fig. 39

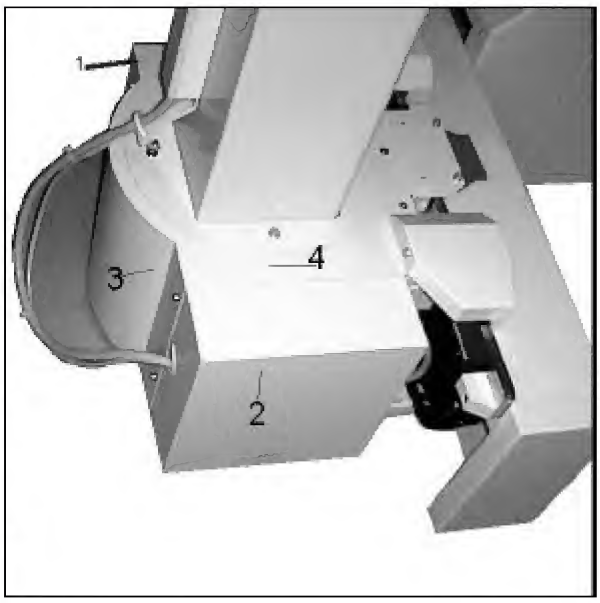

Fig. 40

Mount the left cover (Fig. 40/Pos. 1), the right cover (Pos. 2) and the cover (Pos. 3) to the column carriage (Pos. 4)

2.17 Reconstruction of rail stand

Dismount the left cover (Fig. 41/Pos. 1) and the right cover (Pos. 2) and remount both covers.

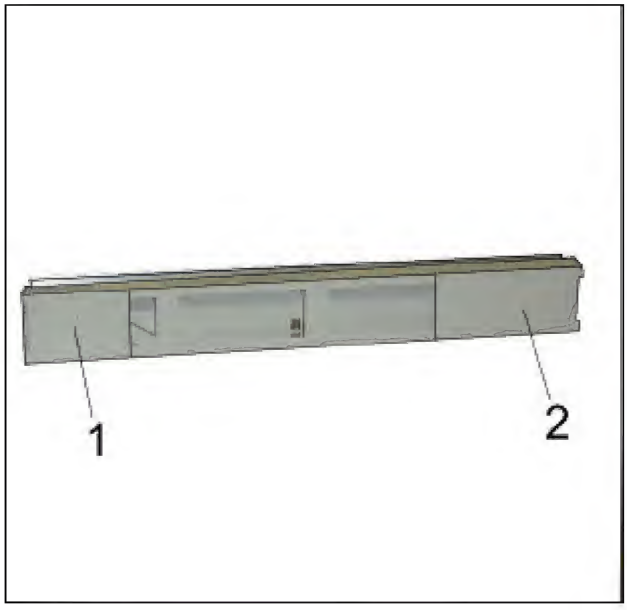

Fig. 41

Fig. 42

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2.18 Reconfiguring the control panel for right hand version

Open cover of control panel (Fig. 42/Pos. 1) and squeeze off both cables. Take out both cables (Pos. 2) and remove control panel.
Dismount the control panel fastening (Pos. 3) from the table transverse frame (Pos. 4). Remove both screw nuts and the lateral screws (Pos. 8) and pull out the turning part (Pos. 7) from Emergency-Stop switch and remount laterally transposed.
Adjust the friction with both screw nuts (Pos. 6) and mount the control panel fastening on the other table transverse frame side. Fasten the control panel with both screws (Pos. 2), squeeze against both cables and remount the cap.

Clean equipment afterwards with a mild cleaning agent.

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3 Adjustment

3.1 Adjustment of the vertical column

The column has been aligned during manufacturing. If the alignment is not vertical after assembly align the column.

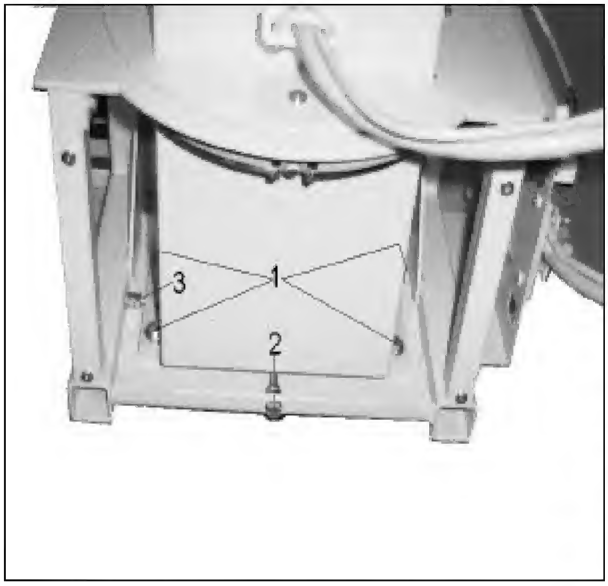

Fig. 43

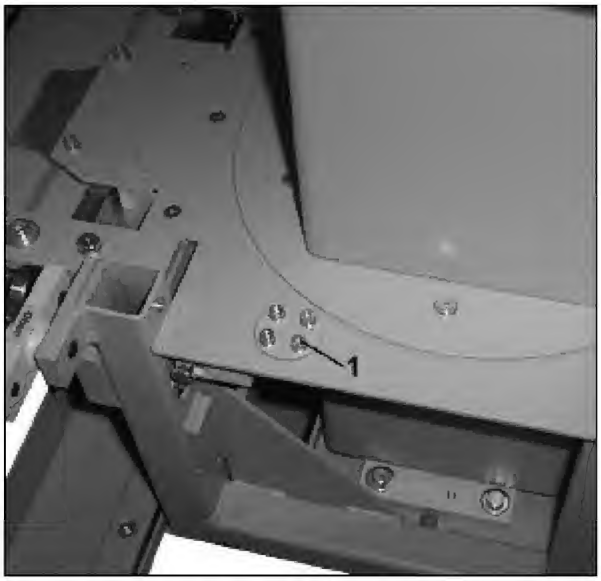

Fig. 44

Remark:
Remove the cover plates (Fig. 40/Pos. 1-3) on the column carriage (Pos. 4). Loosen the 4 screws (Fig. 41/Pos. 1). 4 screws (Fig. 41/Pos. 1). Bring the column in the right position with the corresponding adjusting screw (Pos. 2 or Pos. 3). Fasten again the 4 screws (Pos. 1) and remount the cover plates again.

3.2 Adjustment of the column in direction of rotation

The tube holding support has been aligned during manufacture. If the alignment is not correct after assembly please align.

Remark:
Loosen the 4 screws (Fig. 46/Pos. 1) slightly. Adjust the column in the corresponding direction. Fasten the 4 screws (Pos. 1) afterwards tightly.

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Fig. 45

Fig. 46

3.3 Adjustment of the X-ray tube supportarm rotational axis

The rotational axis has been aligned during manufacture. If the alignment is not correct after assembly please align.

Remark:
Loosen both lower fastening screws (Fig. 45/Pos. 1) and both security screws (Fig. 45 Pos. 2). Perform adjustment with both adjustment screws (Fig. 45/Pos. 3) and the shortened 4 mm socket head cap key. Fasten afterwards the fastening screws and security screws.

3.4 Adjustment of the rotation detent (0°, 90 °)

The rotational axis has been aligned during manufacture. If the alignment is not correct after assembly please align.
Please follow chapter 3.9 first and activate Program 6.
Adjust the 0° position of the tube while loosen the rotation brake. Loosen the threaded pin (Fig 46/Pos 1), rotate the washer (Fig 46/Pos 2) until the yellow SID on the control board lights up and tighten the threaded pin afterwards. Save the value on control panel.

3.5 Adjustment of the table Bucky in the transverse direction

Loosen the screws (Fig. 45/ Pos. 1) from the four fastening strips. Adjust the Bucky transversely and fasten afterwards the four screws again.

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Fig. 47

Fig. 48

3.6 Adjustment of the vertical SID switch

SID switch has been pre-aligned in the factory:
Distance between table top - control arm lower side: **985 mm (SID 1,15 m)** standard value
851 mm (SID 40“) USA version

Remark:
The film object distance has been considered with 7,0 cm and the focus rotation axis distance has been considered with 20 mm. After installation of tube, collimator and Bucky consider the deviated values and adjust the desired SID.
Loosen and displace the trip cam (Fig. 48/Pos. 1) with both screws (Pos. 2) so that the micro switch in the vertical carriage will be activated. If necessary transpose the rail by one hole division. Tighten all screws again.

3.7 Adjustment of control parameters

The control is equipped with an installation function to be able to put in the equipment the customer’s relevant parameters.

Therefore a jumper (Fig. 49/Pos.1) on the interface board has to be changed; the tomo control is now in starting mode and the control panel will show „installation“.
Choose now with the push buttons for tomo height (and) the starting Program (no. 1 until 36) and activate with the test button (visible with * at the end of the upper display).

Amend values in the active program respectively activate movements with the push buttons for tomo height. Save afterwards amended values respectively positions with the PREP-switch or leave the program without saving with the table switch.

Choose now with push buttons for tomo height the next program and proceed as before. After conclusion of the settings, change jumper (Fig. 49/Pos. 1), the equipment is in table mode.

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The control panel in the installation mode is equipped with an amended keyboard function. Use the included paper guide.

- when pushing plus respectively minus key all programs will be listed (separate or fast run)
- the test key activates the desired program (will be shown with the symbol * on the end of the upper display line)
- with the plus respectively minus key values can be integrated amended or movement of the single axis can be performed
- with the PREP-switch the shown condition will be saved

- with the table switch the program can be left without saving.

Remark:
For easy handling of the first operation and for an emergency the control software of each programs equipped with a basic set-up. Can be reactivated later while activating the Program 36 and saving afterwards. All before amended parameters will be deleted.

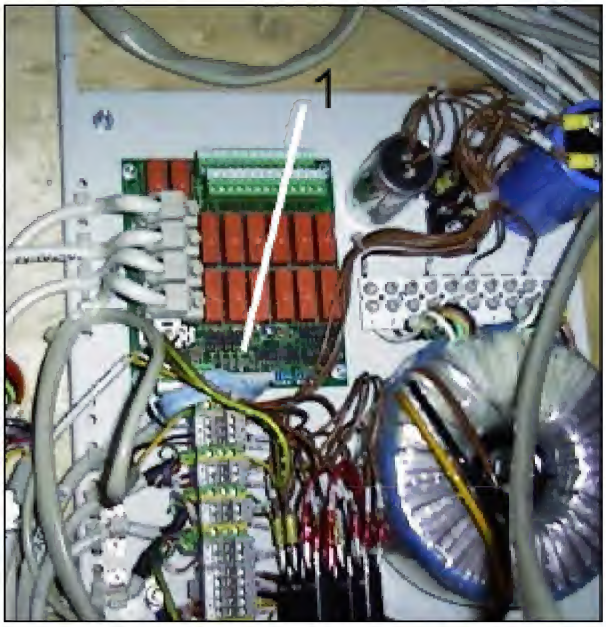

Fig. 49

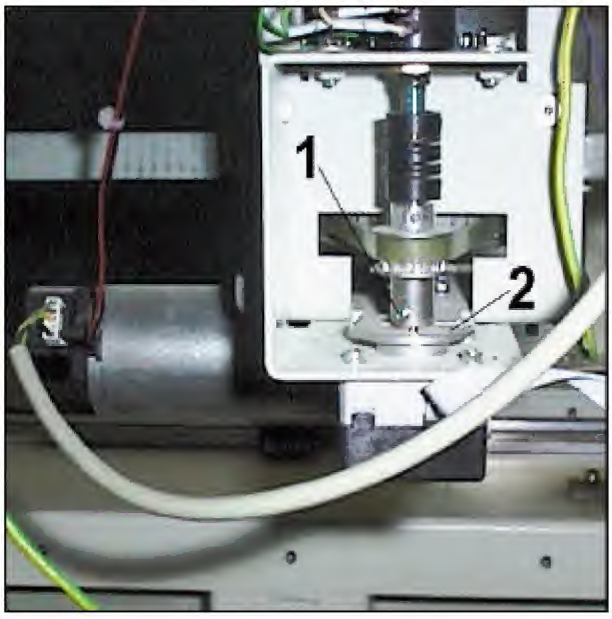

Fig. 50

3.8 Centering of Bucky in table transverse direction

First please follow chapter 3.9, activate Program 13 or drive with the PREP-switch to zero position in the tomo operation method. Check the centering of the film to tube middle with the light and for deviations activate Program 5. Move the Bucky manually to middle centering. Loosen threaded pin (Fig. 50/Pos.1) on Bucky drive. Rotate the regulating washer (Pos. 2) until the yellow SID lights up on the control board. Retighten the threaded pin (Pos. 1). Save value on control panel.

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Remark:
If the middle has changed more than 5 mm, amend also the end positions (Program 9+10).

3.9 Adjustment of the basic set-up, zero points (index) and software end switch

Program 1	language
Standard: German	USA version: change to English
Program 2	unit of measure
Standard: cm	USA version: change to inch

Program 3 **Listing**
Standard: Bucky wall stand left
If the longer travel range of the tube stand is placed on the right side, adjust right.

Attention:
If the Bucky Wall stand has been mounted on the right side, amend the values of the programs 4, 7 and 8, 16 and 18 (A-/B- position) (index and software end switch tube stand).

Program 4 **index column**
Position tube stand on one limit stop, loosen clamp screws of spiral coupling, adjust the potentiometer (=AC-R1) ¼ to ½ rotations for limit stop. Retighten clamp screws of spiral coupling. Position the tube stand to the middle of the table (700 mm from limit stop on the short side of the rail stand).
Activate program; loosen the clamp screw on the incremental transmitter (=AC-U1) and twist the adjusting washer on the incremental transmitter until yellow SID on the board lights up. Then tighten one of the clamp screws on the axis. Save value on the control panel.

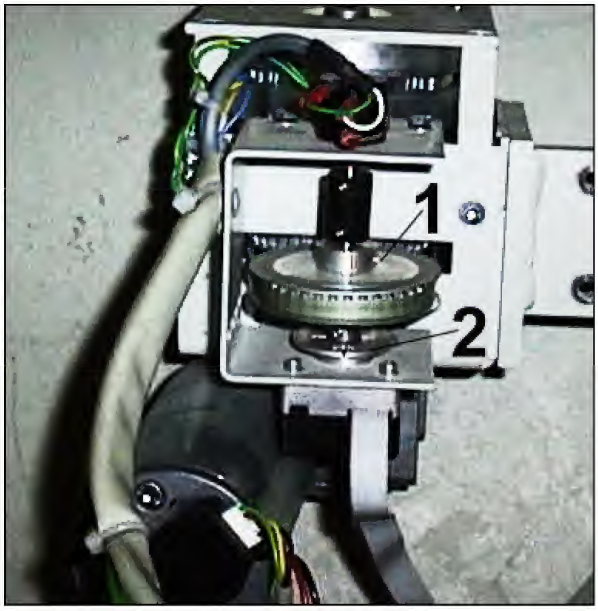

Fig. 51

Fig. 52

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Program 6 index tube
Remark:
The tube stand has to be aligned vertical with an liquid level. Then activate program; loosen clamp screws on gear belt wheel of the travel range (potentiometer has to be preset).
Adjust the tube rotation to 0° (light).
Rotate the adjusting washer on incremental transmitter (=AC-U2) until yellow SID on the board lights up. Then tighten one of the clamp screws on the axis.
Save value on the control panel.

Program 5 index Bucky
Remark:
First align supporting arm (horizontal) and catch of the column rotation. Position Bucky carriage on one limit stop side, loosen clamp screws of the spiral coupling adjust the potentiometer (=AC-R3) ¼ to ½ rotations for limit stop. Retighten clamp screws.
Center Bucky carriage (film middle) to tube stand (laser or light) and activate program.
Loosen clamp screws on the incremental transmitter (=AC-U3) and twist the adjusting washer on the incremental transmitter until yellow SID on the board lights up. Then tighten one of the clamp screws on the axis. Save value on the control panel.

Program 7/8 software-limit stop (ES) tube stand right / left
Activate program.
Move column to left and right limit stop or drive by motor with the push buttons for tomo height (and) .
The traveled range from the zero position will be shown on the control panel - limit stop by approx. 940 mm / 700 mm. Move tube stand approx. 30 mm from limit stop and save values on control panel.

Program 9/10 software- limit stop (ES) Bucky right / left
Activate Program.
Move Bucky carriage to left and right limit stop or drive by motor with the push buttons for tomo height (and).
The traveled range from the zero position will be shown on the control panel. Move Bucky carriage 10 mm from limit stop and save values on control panel.

Program 11/12 software-limit stop (ES) tube right / left
standard set-up from +115° / -115° has not be changed.

Program 13 drive to index
When actuating a push button for tomo height (and) all axis drive to the before adjusted index (zero position) after activating the program. This program is just for control purposes and has not to be followed.

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Adjustment for wall mode and safety range

Program 15/17 SID Bucky Wall Stand A / B
is for the input on the display shown horizontal SID values
Adjustment: **115 cm** **180 cm** (standard)
40 inch **72 inch** (USA version)
Remark: If there is no Bucky Wall Stand set all values on zero.

Program 16 / 18 A-/B-Position
The column position will be shown in mm (starting on zero position) after activating the Program.
Adjustment: **A = -900 mm** (+900 mm for right hand version)
B = -250 mm (+250 mm for right hand version)
B = - 87 mm for USA version (+87 mm for right hand version)
Note: Move column to the corresponding end position or drive motor-driven by using the push button for tomo height (and). Save value on control panel.

Remark: If there is no Bucky Wall Stand set all values on zero.

If necessary correct the adjustments of the programs 15 until 18 while installing the equipment according to the real position of the Bucky Wall Stand.

Program 19 correction range tube stand
The extent of range for A-/B-position where the tube stand brake will be activated when moving manually can be adjusted between 1 mm and 30 mm. The basic set-up 5 has not to be amended during installation.

Program 20 correction range tube
The size of range for 0° - and 90° -position where the correction function works (motor-driven positioning will be shown through flashing of SID on control arm). The basic set-up 5 has not to be amended during installation.

Program 22 Dead time generator
The dead time of the generator can be adjusted from 0-200 mm in 10 mm steps. Determine the dead time from the generator data. Adjust time on control panel and save afterwards.

Adjustment of the equipment specific dimensions

Program 24 film-object-distance
The film-object-distance can be adjusted depending on the used Bucky from 5,0 cm until 10,0 cm. The basic set-up of 7,0 cm has to be amended during installation. Measure the distance from the table top to the cassette tray. Then deduct 1,1 cm from the determined measure because of position of film in cassette. Adjust the result figure on control panel and save.

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Program 25 film-focus-distance
The desired vertical SID can be put in from range 100 cm until 115 cm respectively 38 inch until 45 inch. After installation of tube and collimator (center of gravity) as well as Bucky the SID-switch in the column has to be adjusted to this value and glue the included tomo bench mark.
Basic set-up 115 cm (standard) respectively 40 inch (USA-version).

Program 26 table top-rotation-distance
can be adjusted from 85,0 cm until 112,0 (rotation = rotation axis of supporting arm)
Adjustment: 106,0 cm standard respectively 92,6 cm (USA version) has to be measured during installation corresponding to correct adjustment of SID and to be corrected.

Remark: The correct adjustment of the SID on the equipment and the exact input of the values in Program 24 and 26 determines the exactness of the fulcrum height during tomo exposure!

Control system and tomography-exposure time

Program 23 Exposure Control
Choose between angle controlled (radiation release switched-off during tomo exposure with the tomo control) and time controlled (radiation release switched-off with generator)..

Program 27 - 34 exposure time tomography
two exposure times of each Tomographic angle can be chosen in steps of 0,1 s within the marked range:
8° 0,4 s to 1,2 s
20° 0,6 s to 3,0 s
30° 1,0 s to 4,0 s
40° 1,5 s to 4,0 s
Basic set-up (biggest and smallest time of each angle) has to be amended during installation to generator.

The adjusted values shall be recorded in the file „customers setting“ of the parameter index (see enclosure). This index is included to the mounting instructions and supplied to the customer.

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Installation-Program 1 to 36

no.	designation	selection possibility	default parameter	customers setting
1	language	german / English	English	
2	unit of measure	cm / inch	inch	
3	installation	left / right	left	
4	index column	set	*	
5	index Bucky	set	*	
6	index tube-rotation	set	*	
7	end position column right	drive	+670 mm	
8	end position column left	drive	-670 mm	
9	end position Bucky right	drive	+220 mm	
10	end position Bucky left	drive	-305 mm	
11	end position tube rot. ccw	drive	+115 Grad	
12	end position tube rot. cw	drive	-115 Grad	
13	----			
14				
15	SID wall stand A	90-204cm / 35-80“	115 cm / 40“	
16	A-position	drive	-900 mm (+900)	
17	SID wall stand B	90-204cm / 35-80“	180 cm / 72“	
18	B-position	drive	-250 mm (+250) -87 mm (+87)	
19	capture range column	±1-±30 mm	± 5 mm	
20	rotational index range	±1-±10 Grad	±5 Grad	

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22	delay-time x-ray*	0 - 200 ms Step 10 ms	0 ms	
23	exposure timing	by generator / by tomo	by generator	
24	object-film-distance	5,0-10,0cm	7,0 cm	
25	SID vertical	100-115cm / 38-45“	110 cm USA 40“	
26	table top-pivot distance	85,0-112,0 cm	106,0 cm USA 92,6	
27	exposure time 1 / 8 degr.	0,4 - 1,2 s	0,4 s	
28	exposure time 2 / 8 degr.	0,4 - 1,2 s	1,2 s	
29	exposure time 1 / 20 degr.	0,6 - 3,0 s	0,6 s	
30	exposure time 2 / 20 degr.	0,6 - 3,0 s	3,0 s	
31	exposure time 1 / 30 degr.	1,0 - 4,0 s	1,0 s	
32	exposure time 2 / 30 degr.	1,0 - 4,0 s	4,0 s	
33	exposure time 1 / 40 degr.	1,5 -4,0 s	1,5 s	
34	exposure time 2 / 40 degr.	1,5 - 4,0 s	4,0 s	
36	set default parameter	reset	-------	---------

*** The zero positions of the axis are adjusted so that:**

- the tube stand is positioned to table center
- the central ray of the tube is vertical
- the Bucky middle to the tube is centered

NOTE:

The indicated and saved analog valve of the potentiometers on the control panel varies depending on the mechanical basic set-up. This will not influence the exact centering of the axis. It is decisive that the mechanical axis position corresponds with the index of the incremental transmitter.

Attention!

If the zero positions (program 4 and 5) will be amended more than 5mm afterwards for example during installation, the software end positions (program 7 until 10) have to be amended, too.

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3.10 Error advise

The control is in the position to recognise certain error conditions and to react accordingly. If one of the below mentioned error will be recognised, the upper display line will show failure E -xx“ with the corresponding error code. The lower display line will show „Reset equipment!“ respectively „call service“! in case that the error occurred during initialisation / drive to index.

Error E-XX
reset unit!

Error E-XX
call service!

Additionally the control shuts off all operation and a supplementary produced NOT-STOP signal shuts off all motors.

Implemented error codes

E -37 Motor side towing distance exceeding of the column
E -38 Motor side towing distance exceeding of the Bucky
E -39 Motor side towing distance exceeding of the tube rotation
E -52 Power take-off side towing distance exceeding of the column
E -53 Power take-off side towing distance exceeding of the Bucky
E -54 Power take-off side towing distance exceeding of the tube rotation

These error codes will be produced in case that the deposit towing distance has been exceeded in the starting programme.

E -60 Error in EPROM (parameter saving)
The adjusted parameter are packed in one EPROM. For safety reason there are two separate save blocks with check total control available. If both save blocks are defective during initialisation, this error will occur.

E -61 Error in data travel of the Token ring
The control part controls permanently the data travel of the Token ring. In case of error (brake of connection, defect of motion controller, adulterated telegrams), this error message will occur.

Remove of error:

In case of error message switch-off equipment and try again to switch-on after approx. 3 minutes. If the error message is still visible check all connections from **E -37 until E -54** from and to the potentiometers, also to the incremental remitter as well as the potentiometer and the incremental remitter.

For **E -60** set the jumper on starting. Switch-on equipment while pushing angle and A-switch. Setting-ups from the factory will be loaded. Switch-off equipment, switch-on again after some time, proceed starting. Set back starting-jumper, Parameters will be saved.

For **E -61** check all data connections as well as the motion controllers.

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4 Technical Maintenance

4.1 Mechanical and electrical tests

The maintenance schedule described below shall be de at 12-month intervals. If functional tests require power, switch off power immediately afterwards.
Defective parts must be replaced by genuine spare parts according to spare part lists. Use only non-acid grease for maintenance. Do not grease or oil ball bearings with sealing washers.

Preliminary work: Check column of damages or missing parts.
Check all cables upon damage especially on the fastening points.
If necessary replace or repair. The defective components.
Check electrical cable loop of sufficient length.
Check all covers. If necessary replace damaged.
Check range of equipment movements. When collision danger apparent inform the user of all risks.

Tools: Usual assembly tools, standing ladder, torque balance key, liquid level, spring balance, feeler, cleansing agent, grease, wooden Spacer .....cm lg.,

Preparations: Switch off equipment
Dismount bumper and stop (Fig.45/Pos. 1+2) at either end of the table top from profile rail (lateral).

Fig. 55

Fig. 56

Take out table top and lay aside securely.
Dismount front cover (Fig. 56/Pos. 1+2).
Remove cover left and right (Fig. 57/Pos. 1).

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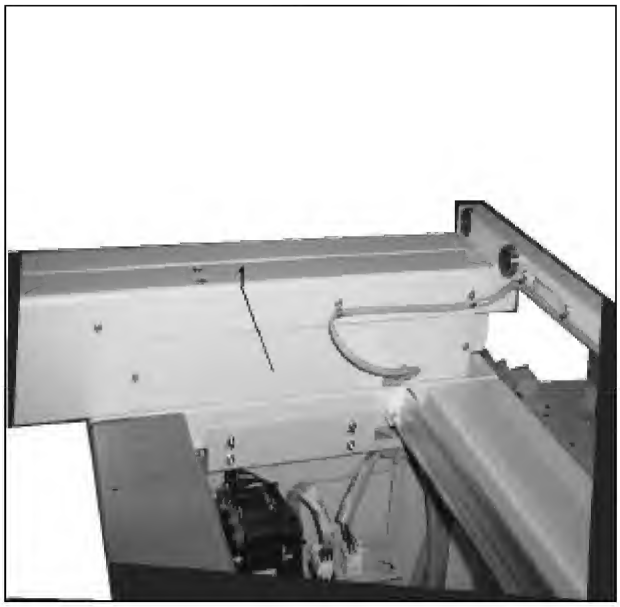
Dismount front border (Fig. 57/Pos. 1) and center cover (Fig. 58/Pos. 1+2).
Dismount cover cap (Fig. 59/Pos. 1) on the left and right side of the rail stand.



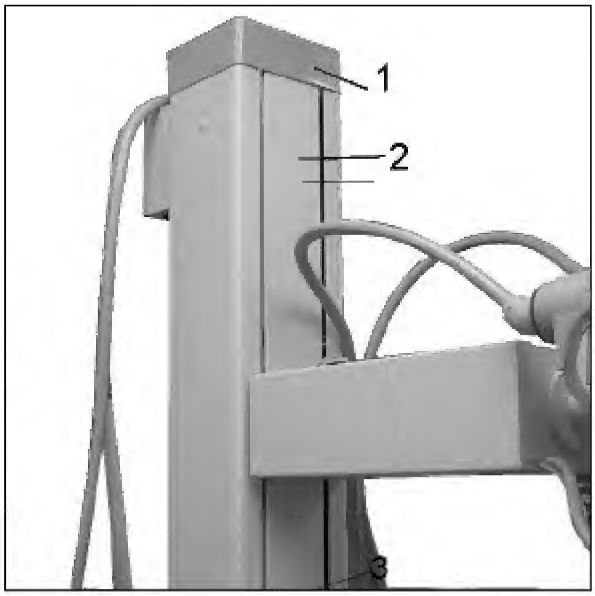


Fig. 57 Fig. 58

Floor mounting: Check firmness of dowel bolts. Tighten if loose. Torque wrench 50 Nm (5.0 mkp).

Bucky carriage: Check on smooth running over total travel range. Running noise ?
Determine defective bearings. Replace if necessary.
Clean guide rail and bearings and oil lightly.
Check and if necessary adjust eccentric bearing (Fig. 60/Pos. 1).
Correct adjustment: The bearings can still be rotated by hand.
Check bumpers (Fig. 60/Pos. 2) on firmness and damage.

Switch-on equipment. Check brake (Fig. 60/Pos. 3) and adjust if necessary.

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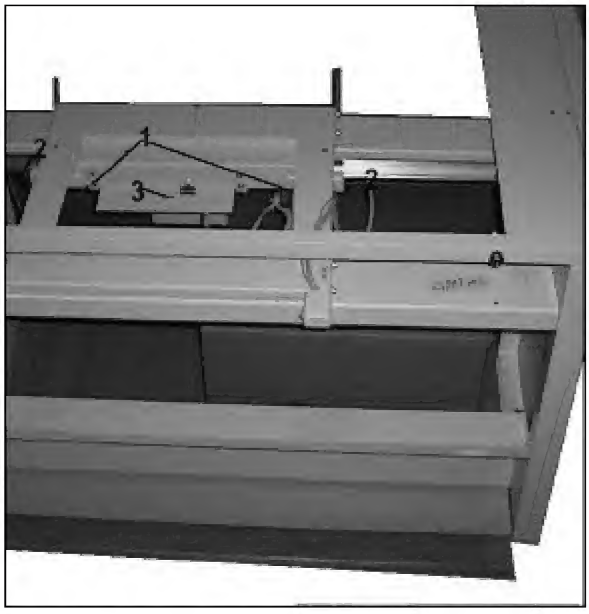

Fig. 59 Fig. 60

Table frame: Clean left and right guide shafts (Fig. 61/Pos. 1) and oil lightly.

Switch-on equipment. Check performance brakes for transverse movement (Fig. 61/Pos. 2). Adjust if necessary.

Check bumpers on both sides (Fig. 61/Pos. 4) on firmness and damage.

Fig. 61 Fig. 62

Remount the caps on the left and right side (Fig. 57/Pos. 1).

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Table top: Check plastic rollers (Fig. 63/Pos. 5) for trace of wear. Replace and grease if necessary.
Clean and check all ball bearings for table top movements to assure smooth motion. Replace and grease if necessary.

Fig. 63

Fig. 64

Clean guide profiles of the table top.
Insert table top. Move over total travel range.
Running noise ? Smooth running ? Adjust bearings with eccentric (Fig. 63 /Pos. 6) if necessary.
Switch on equipment. Check performance of brake (Fig. 63/Pos. 7).
Replace brake magnet if necessary .
Remount bumper and stop (Fig. 55/Pos. 1+2) at either end of the table top to profile rail sides.

Foot Treadle: Check on smooth operation and contact point. Adjust switch (Fig. 52/Pos. 1) if necessary.
Check connections of the switches.
Grease lightly both spring axis and bearing axis.

Vertical carriage: Clean guide rail of the column and runners of the vertical carriage. Check on damage and grease lightly. Check on smooth running over entire travel range. Running noise ? Determine defective bearing. Replace if necessary.

Check performance of safety brake.

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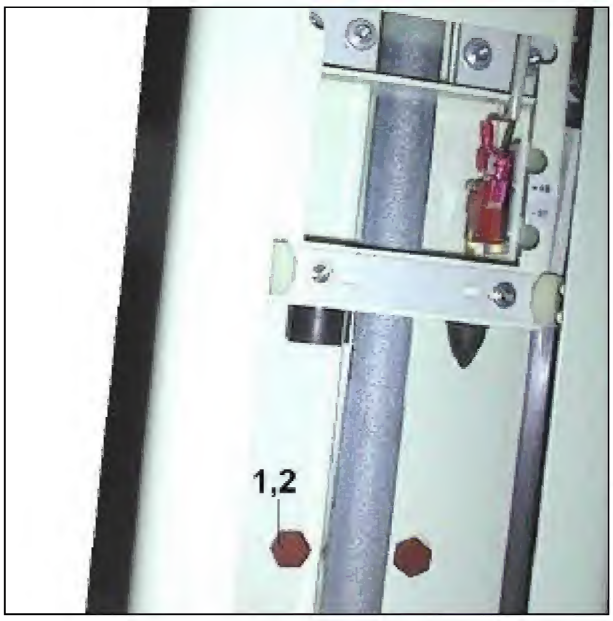

Fig. 65

Fig. 66

Note: Drive vertical carriage fully down until the threaded bore-hole (Fig. 65/Pos. 1) of the counterbalance is coincide with bore-hole in the column. Tighten counterbalance with screws M8 (Fig. 65/Pos. 2) and c corresponding washers. Lift vertical carriage some cms and release only if vertical carriage is suspended to the safety brake. Lift vertical carriage again, pull through safety brake, loosen on rope (Fig. 66/Pos. 4) to the head side. Release slowly vertical carriage. Dismount screws (Fig. 65 /Pos. 2).

Fig. 67

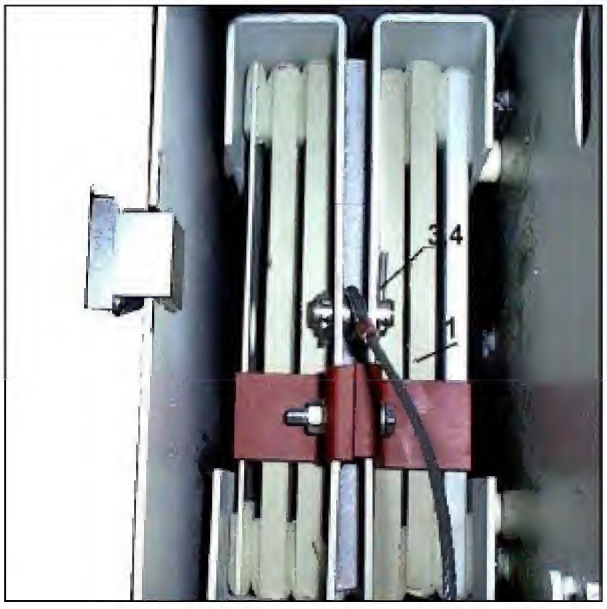

Fig. 68

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Clean steel rope (do not use fat solvents) and check for damage with cotton waste. Check on smooth running over entire travel range. At the slightest sign of damage -. Remove the Equipment for use until the defective cable has been replaced. Further use of the equipment could endanger the security of patient and user. Do not use the equipment until the defective rope has been replaced.

Attention: The exchange of the rope has to be done at least every 3 years

Note: Drive vertical carriage fully down until the threaded bore-hole (Fig. 65/Pos. 1) of the counterbalance is coincide with bore-hole in the column. Tighten counterbalance with screws M8 (Fig. 65/Pos. 2) and corresponding washers.
Lift vertical carriage approx. 30 cms and release only if vertical carriage is suspended to the safety brake. Lift head part (Fig. 67/Pos. 1) to the top and tighten with a cord to the column.
Dismount steel rope of the counterbalance (Fig. 68/Pos. 1) after careful removal of the security washers (Fig. 68/Pos. 3) and bolts (Pos. 4).
Support vertical carriage with the wooden lath. Remove screws (Fig. 66/Pos. 1) and security plate (Pos. 2).
Release the lever of the safety brake (Fig. 4) in direction of the compression spring and pull out to the front the bolt (Pos. 3).
Release rope from the safety brake. Remove from the head part the safety ring with safety nippers and dismount rope after removal of both security screws (Fig. 69/Pos. 1).
Insert new rope in the head part and fasten to safety brake and counterbalance. Insert again the head part, pay attention to correct fitting. Remount lever of the safety brake to vertical carriage. Lift again the vertical carriage slightly while pulling through safety brake of the rope to the frontal side respectively releasing while pushing the safety brake against the compression spring. Then let off vertical carriage slowly. Dismount screws (Fig. 65/Pos. 2).

Check bearing play of the runners.

Note: Put a paper strip (thickness of 0,1 mm) between guide surface and opposite bearing. If necessary press the opposite bearing with a screw turner after removal of the screw (Fig. 59/Pos. 1) and tighten the screw again.

Remark: The opposite bearings must be rotatable by hand over the entire travel range.

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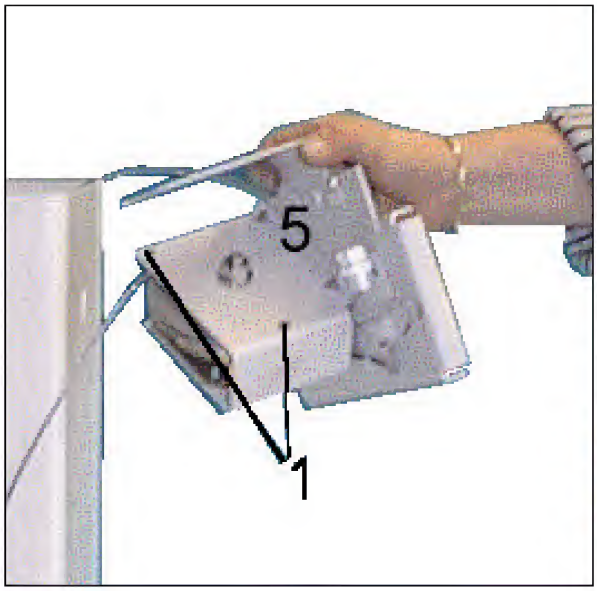

Fig 69

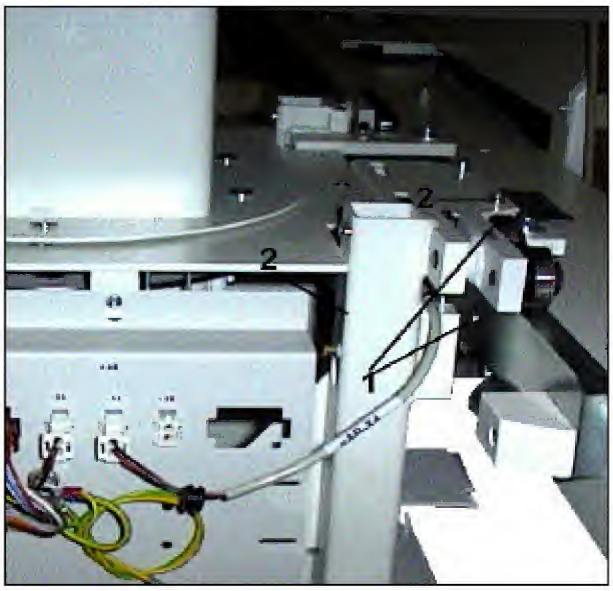

Fig. 70

Vertical brake: Remove abrasion of the magnet brake (Fig. 67/Pos. 3). Check air gap of the magnetic clutch with feeler. Nominal value: 0,4 - 0,5 mm. Check brake power over the entire travel range. Should be min. 150 N.
The air gap can be adjusted when adding or removing washers.
Note:
Drive vertical carriage fully down until the threaded bore-hole (Fig. 65/Pos. 1) of the counterbalance is aligned with bore-hole in the column. Tighten counterbalance with screws M8 (Fig. 65/Pos. 2) and corresponding washers. Lift vertical carriage approx. 30 cms and release only if vertical carriage is suspended to the safety brake. Lift head part (Fig. 67/Pos. 1) to the top and tighten with a cord to the column. Dismount steel rope of the counterbalance (Fig. 68/Pos. 1) after carefully removal of the security washers (Fig. 68/Pos. 3) and bolts (Pos. 4). Dismount steel rope after removal of both security screws (Fig. 69/Pos. 1). Dismount guide block (Pos. 5) and adjust difference with washers. Remount guide block. Insert head part, pay attention to correct fitting. Lift again the vertical carriage slightly while pulling through safety brake of the rope to the frontal side respectively releasing while pushing the safety brake against the compression spring. Then release the vertical carriage slowly. Dismount screws (Fig. 65/Pos. 2).

Column carriage: Clean runners of column carriage. Check upon damage and grease slightly.
Check smooth running over entire travel range. Running noise ?
Determine defective bearing. Replace if necessary.
Check bearing play of the runners.

Note:
Put a paper strip (thickness of 0,1 mm) between guide surface and opposite bearing. If necessary press the opposite bearing with a screw turner after removal of the screw (Fig. 70/Pos. 1) and tighten the screw again (Fig. 70/Pos.2).

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Remark: The opposite bearings must be rotatable by hand over the entire travel range.
Switch on equipment. Check function of brake (Fig. 71/Pos. 4). Adjust if necessary.
Note: Loosen screws (Fig. 71/Pos. 5) and displace magnet angle until the play between brake rail and magnet is 0,2 mm. Tighten screws again.

Rail stand: Clean upper and lower guide rail. Check on damage and grease slightly. Check end stops on damage and check fitting. Check column stand with air level over the entire travel range. Adjust variations while adding spacers under or between.

Cleaning: Dirt accumulation which are not accessible to cleaning staff must be removed during maintenance work.
Soak contrast agent with water and remove.
After completion of the maintenance work clean all dirt accumulation.

Tomo Program: Check all programmes according to chapter 3.11 and adjust if necessary:

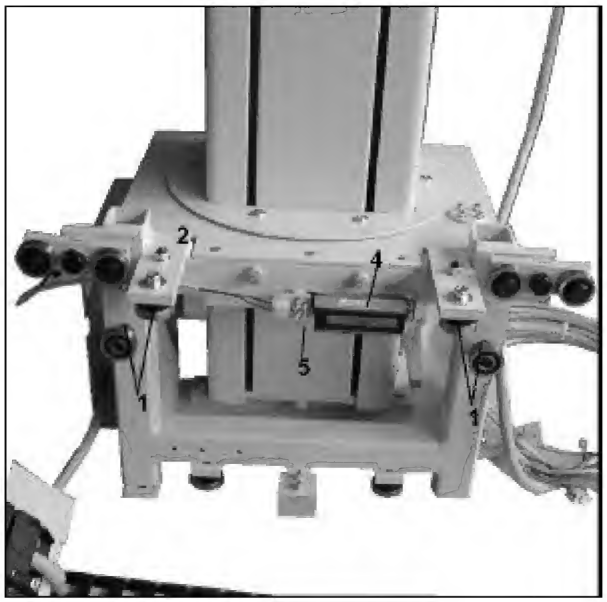

Fig. 71

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4.2 Functional Tests

Vertical Travel Mechanism:

- Turn on unit. Check performance by raising/lowering mechanism over entire travel range:
- Automatic stop in top/bottom end positions as well as in preset exposure position?
- Smooth starting and slowing down of Foot switch?
- Accurate performance of Foot switch ?
- Accurate performance of safety switch?
- Proper spring suspension of switches?
- No brushing of outer jacket against base panelling?
- No automatic lowering at load?

Table Top:

- Check performance of floating by travelling table top over entire range both longitudinally and transversely:
- Moving smoothly? Running without noise?
- Bumper stops for longitudinal/transverse movements?
- No tendency to self-positioning?
- Accurate braking in working position?
- Accurate releasing of brake?
- Accurate performance of foot switch resp. of safety switch?
- Proper spring suspension of switches?

Bucky Carriage:

- Check performance of Bucky carriage over entire travel range.
- Moving smoothly?
- Running without noise?
- Accurate breaking in any working position?
- Accurate releasing of brake?
- Smooth cassette insertion?
- Smooth operation of cassette clamping device?
- Function of motorised centring ?

Tube stand carriage:

- Check performance of tube stand carriage over entire travel range.
- Moving smoothly?
- Running without noise?
- Accurate catching of column catch?

Vertical carriage:

- Check performance of vertical carriage over entire travel range.
- Moving smoothly?
- Running without noise?
- Accurate breaking in any working position?
- Accurate releasing of brake?
- Smooth running of robe return pulley?
- Twist-free running of robe?

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Control arm:

- Check function of SDI's
- Do they light up after the function has been fulfilled?
- Tight fitting of control arm onto support?
- Does the goniometer show the correct value?

Rotation of X-ray tube*:*

- Check performance of entire rotation range of X-ray tube
- Moving smoothly?
- Running without noise?
- Accurate breaking in any working position?
- Accurate releasing of brake?

Control panel tomo:

- is the friction in each turning position available?
- Correct switch of all push buttons?
- is the function of the emergency stop available?
- all SDI's light up during **Program** selection?

Digital display

- is the indicated value correct?
- no jumping of values visible?

Electric

- Check all connections upon damage
- Proper fitting of all plug connections?
- Accurate connection of all strain relieves?

Exposure Release:

- Drive to exposure position. Be careful to observe radiation protection measures.

- Trigger exposure.
- Exposure taken ?
- Change height to a position outside exposure position.
- Try exposure.
- No exposure?

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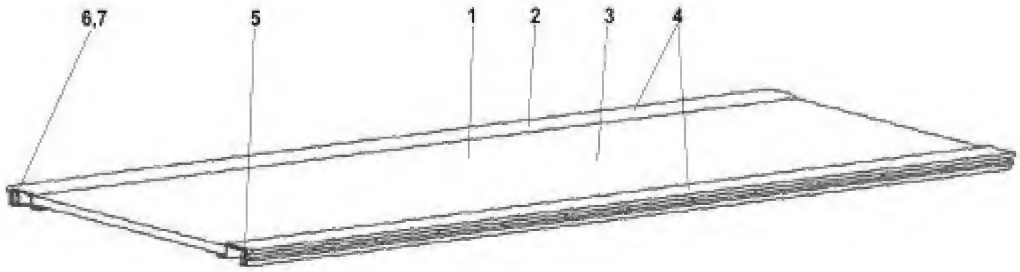
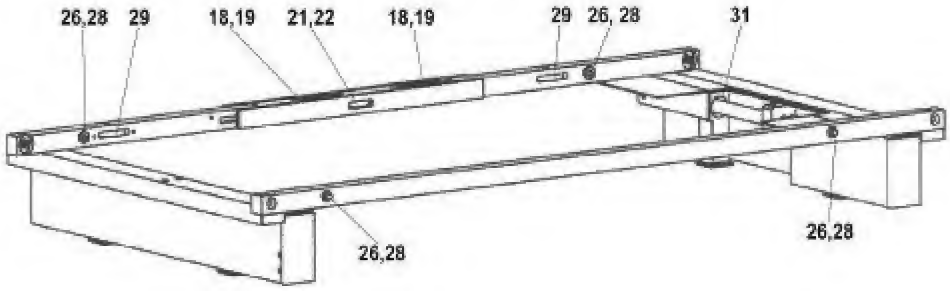
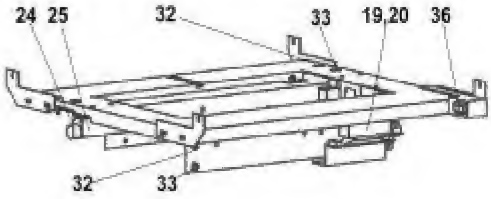
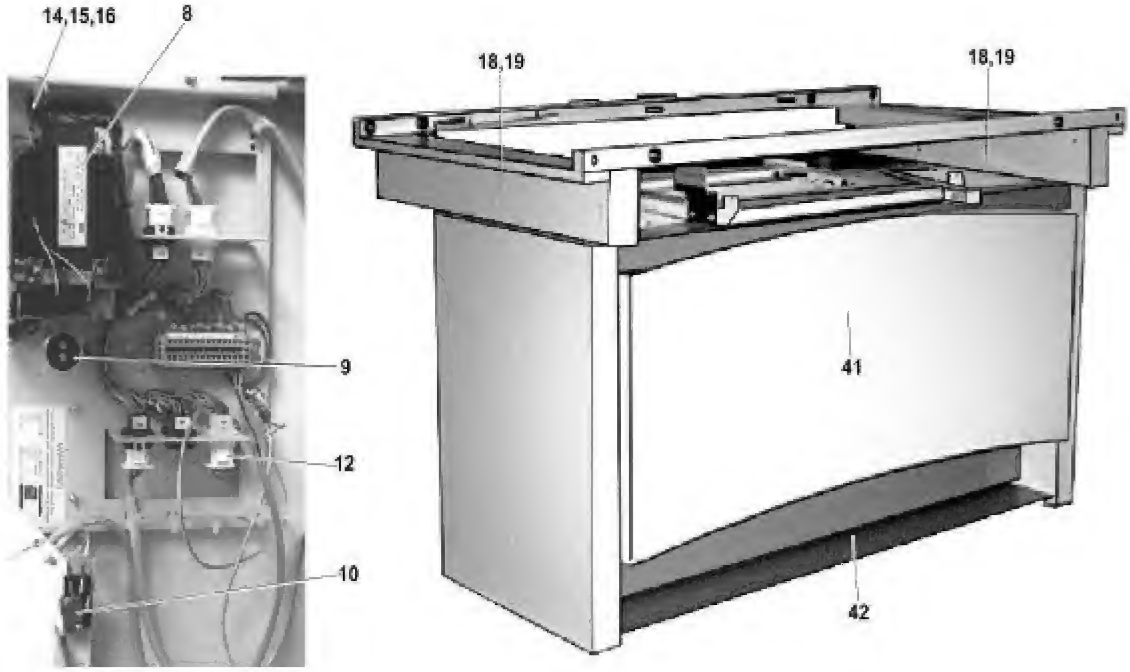
4.3.1 Spare parts table









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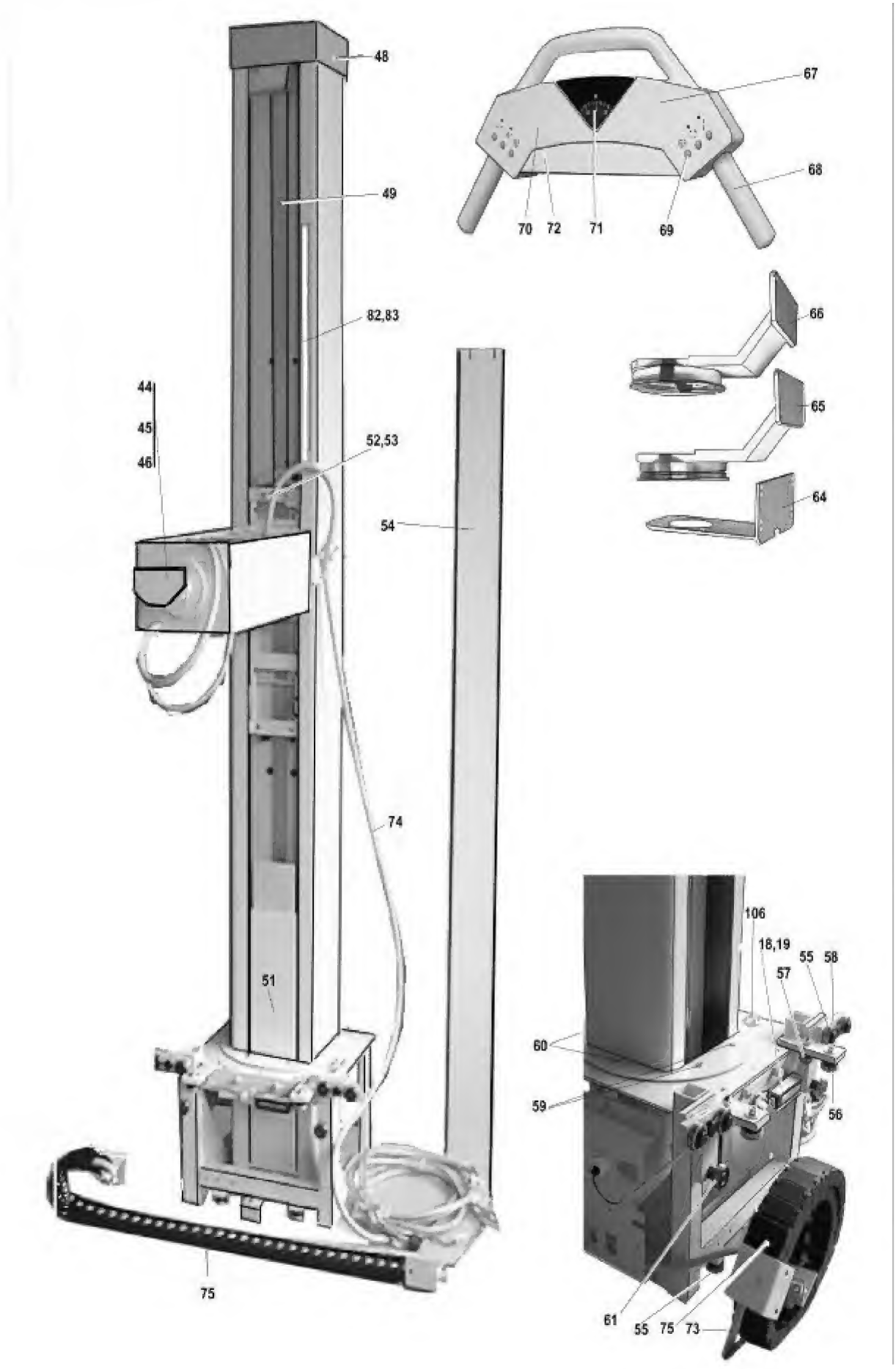
4.3.2 Spare parts colunm 1



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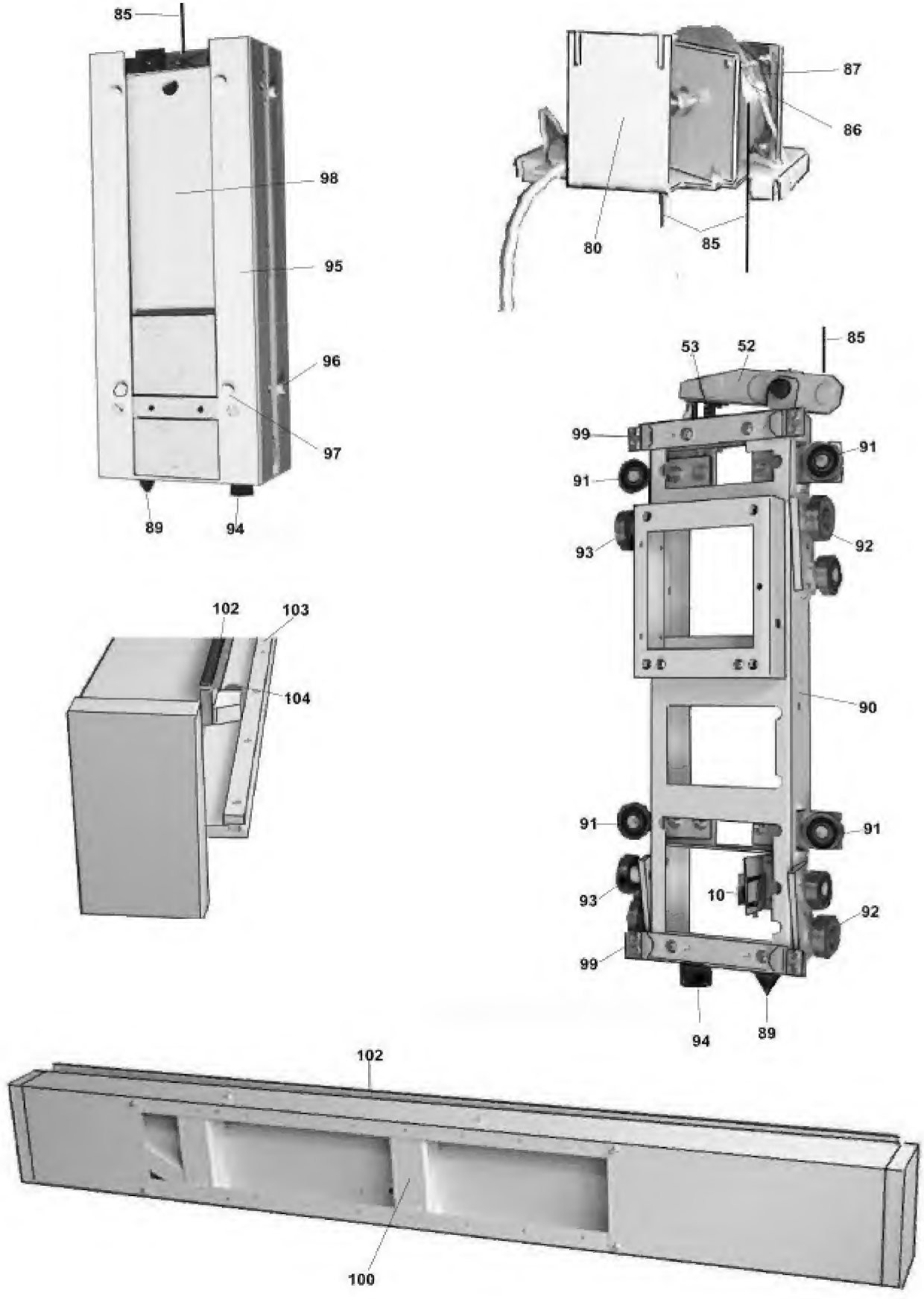
4.3.3 Spare parts colunm 2



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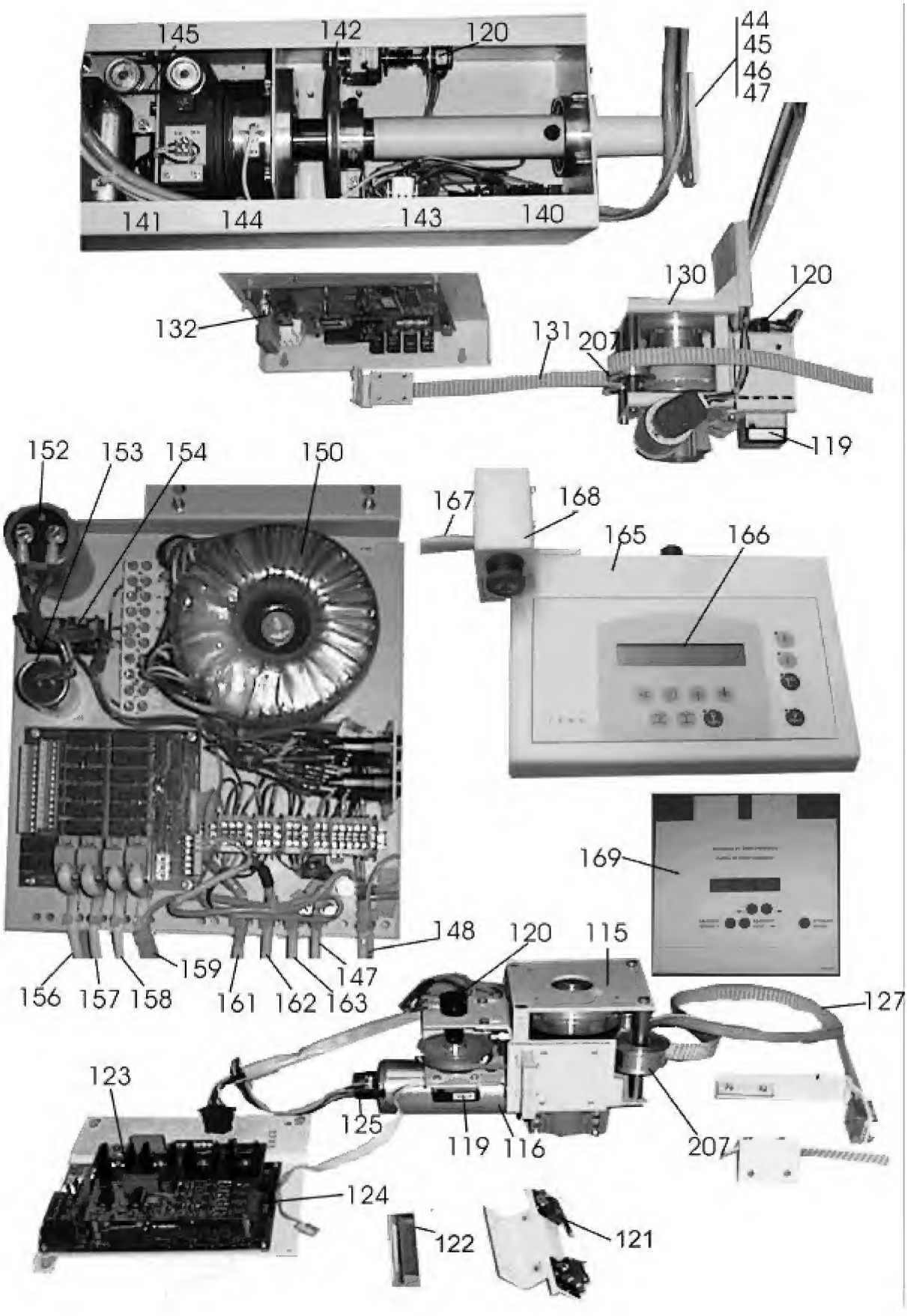
4.3.4 Spare parts Tomo



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4.4 Spare Parts List

Description / Order No.

Note:
Defective parts must only be replaced by genuine spare parts as listed below. When ordering please always specify the serial number of the unit and the full order number of the part.
Parts or part assemblies may only be replaced by the manufacturer or parties expressly authorised. See also chapter on *„Safety Procedures“.*

Pos.	Description	Order-No.
1	Table top complete	0622 0540a
2	Table top frame	0622 0541
3	Table top	0622 0548
4	Profile rail	0622 0549
5	Stop	0622 0550a
6	Stop	0622 0550b
7	Bumper	0005 0164g
8	Power supply	0006 0449
9	Capacitor	3110 0028
10	Switch	0006 0184
11		
12	Bridge plug	0632 0306
13		
14	Fuse plug 1,6A	0006 0308b
15	Fuse plug 3,2A	0006 0308g
16	Fuse plug 10A	0006 0308k
17		
18	Laminated spring	0632 0418
19	Brake solenoid	0006 0603
20		
21	Guide pulley	0632 0420
22	Eccentric	0632 0421
23		
24	Bumper	0005 0108
25	Bumper support	0622 0620
26	Bearing with eccentric	0622 0555
27		
28	Bearing with bushing	0622 0556
29	Guide pulley	0632 0422
30	Bearing	2400 0013
31	Bearing	0005 0191a
32	Eccentric axis	0632 0659
33	Bearing axis	0632 0657
36	Button	0006 0720a
37	Switch	0006 0079a
38	Catch lever	0322 0637b
39	Catch lever	0322 0637a

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Pos.	Description	Order-No.
40	Switch lever	0006 0450
41	Trough complete	0632 0160
42	Pedal	0632 0125
43	Eccentric axis	0632 0610
44	Tube support arm 100 mm	0125 0815a
45	Tube support arm 127 mm	0125 0815b
46	Tube support arm GE	0125 0815d
47	Tube support arm Toshiba	0125 0815e
48	Head piece weld	0125 0580
49	Strip	0125 0550
50	Tube saddle	0125 0780
51	Cover bottom	0370 0138
52	Spring	0005 0159
53	Safety brake II	0125 0733
54	Cover top	0125 0570
55	Bearing with bolt	0125 0374
56	Bearing with eccentric	0125 0369a
57	Bearing with bushing	0125 0369b
58	Bolt	0125 0383
59	Bearing with bolt	0125 0376
60	Bearing with eccentric	0125 0377
61	Bearing with eccentric	0125 0373
62	Solenoid bracket	0006 0687
63	Detent quick release group	0125 0880
64	Control housing	0322 0629
65	Control housing	0322 0270
66	Control housing	0322 0273
67	Control handle assembly	0125 1000a
68	Handle	0125 1008
69	Button	
70	Print board	0125 1020
71	Angle indicator	0125 1010
72	Table measure	0125 1019
73	Cable table	0125 1607a
74	Cable column	0125 1606
75	Timing Belt	0006 0686
76	Spring	0005 0042f
77	Pulley	0322 0118
78		
79		
80	Column top assembly	0125 0650
81		
82	Scale cm	0008 0106
83	Scale inch	0008 0107
84		
85	Wire rope	0125 0662
86	Wire rope pulley	0125 0659
87	Solenoid bracket	0323 0555
88		
89	Parabolic spring	0005 0103a

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Pos.	Description	Order-No.
90	Vertical carriage	0125 0701
91	Mounting plate	0125 0725
92	Bearing balance	0125 0720a
93	Bearing balance	0125 0720b
94	Bumper	0005 0164h
95	Counterweight	0125 0601b
96	Glide block	0125 063
97	Glide block	0125 063
98	Weight plate	0125 0623
99	Profile	0370 0137
100	Rail assembly	0125 0115
101		
102	Rail	0125 0202
103	Floor guide rail	0125 0136
104	Stop	0125 0137
105		
106	Detent quick release group	0125 0340
107		
108	Catch	0125 1243
109		
110		
111		
112	Switch	0006 0184
113	Wiper	0322 0131
114	Guide for wiper	0322 0130
115	Drive motor	0502 0120
116	Gear motor	0006 0734
117	Return pulley	0502 0128
118	Gear belt	0005 0361b
119	Incremental transmitter	0006 0718
120	Potentiometer	0006 0251a
121	Switch	0006 0184
122	Trip cam	0125 0248
123	Limit step board	0502 0470
124	Column Motion controller	0502 0460
125	Cable impulse sender	0502 0419
126	Cable drive block	0502 0406
127	Gear belt	0502 0121
128		
129		
130	Drive block comp.	0502 0220a
131	Gear belt	0502 0214b
132	Bucky Motion controller	0502 0462
133	Cable interface	0502 0417
134		
135		
136	Gear motor	0006 0733
137	Return pully	0323 0648
138		
139		

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Pos.	Designation	Ordering No.
140	Support arm mounted	0125 0802
141	Gear motor comp.	0502 0320
142	Incremental transmitter	0006 0718b
143	Tube Motion controller	0502 0461
144	Cable drive tube	0502 0407
145	Gear belt	0005 0361a
146		
147	Cable	0502 0403
148	Cable	0502 0411
149		
150	Power supply	0006 0746
151	Capacitor 10 000 ● F	3110 0029
152	Capacitor 30 000 ● F	3110 0030
153	Rectifier	0006 0230b
154		
155	Interface board	0502 0450
156	Cable	0502 0401b
157	Cable	0502 0401a
158	Cable	0502 0401c
159	Cable	0502 0405
160	Power interface filter	0501 0660c
161	Cable	0502 0417
162	Cable	0502 0404
163	Cable	0502 0402
164		
165	Control panel complete	0502 0500
166	Board front plate	0502 0505
167	Cable	0502 0405
168	Joint with emergency-stop	0502 0520
169	Guide form	0502 0502
170		
171		
172		
173		
174		
175	Eprom column	0502 0480
176	Eprom tube	0502 0480
177	Eprom Bucky	0502 0480
178	Eprom control panel	0502 0485

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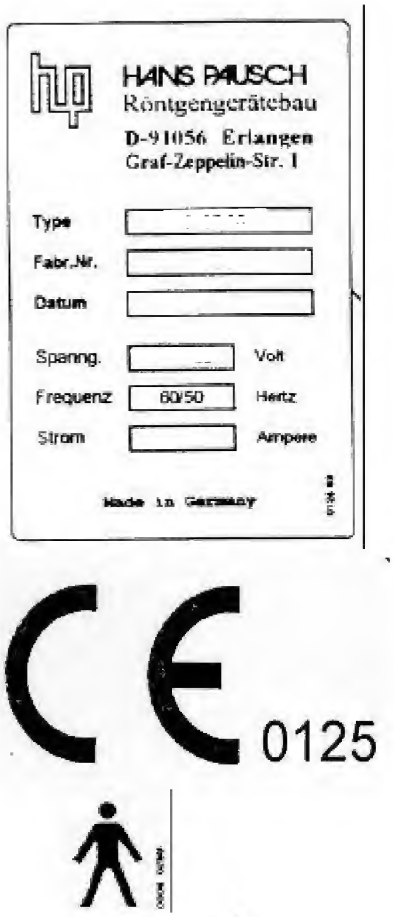
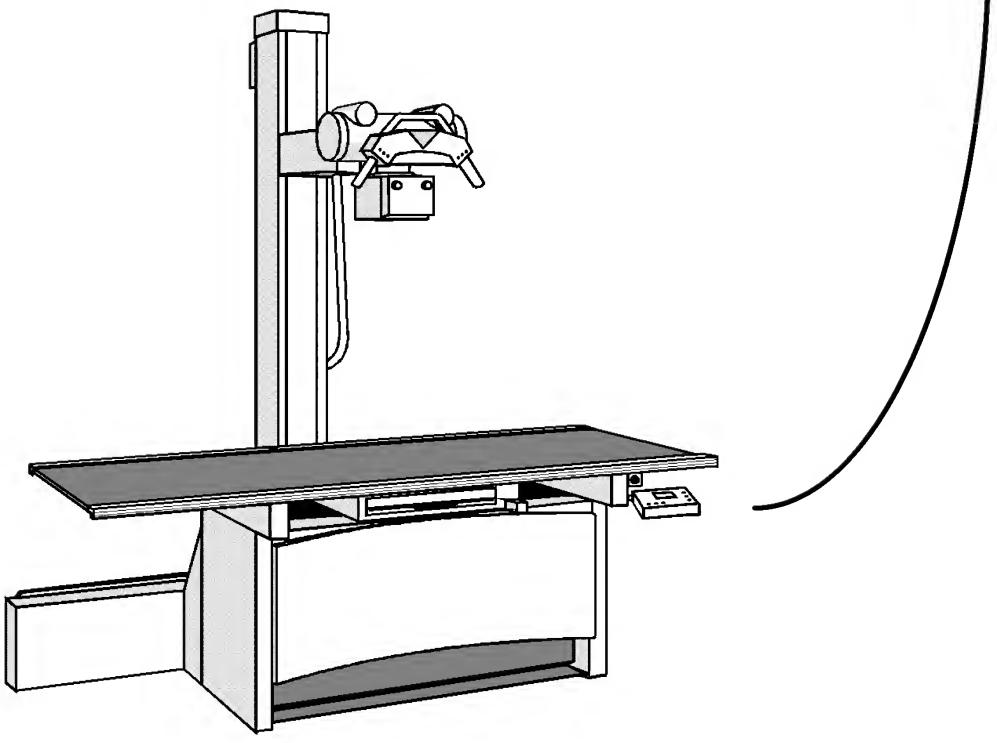
4.5 Maintenance Documentation

Name Plate Location:





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4.6 Maintenance Certificate

The maintenance according to the attached maintenance instructions has been carried out. Any parts replaced were original spare parts as shown on the list.

Replaced parts (List item no. only)

Date Name of company Signature

Replaced parts (List item no. only)

Date Name of company Signature

Replaced parts (List item no. only)

Date Name of company Signature

Replaced parts (List item no. only)

Date Name of company Signature

Replaced parts (List item no. only)

Date Name of company Signature

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